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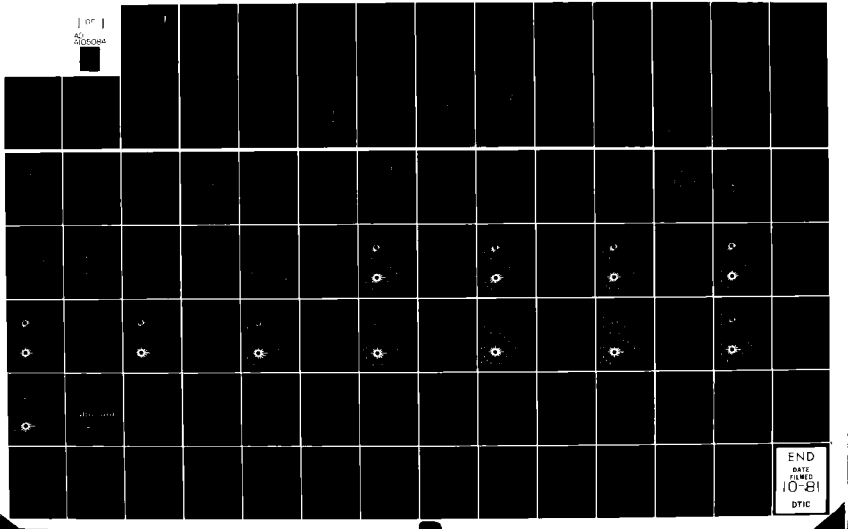

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20. ABSTRACT *(Continue on reverse side if necessary and identify by block number)*: This TFRN discusses the location, topography and local effects of Scott AFB, IL. The meteorological importance of the Great Lakes, air pollution sources, and physical location of weather equipment are presented. The area's synoptic climatology is described and illustrated with typical examples. Climatic aids, forecasting techniques and problems are also discussed.	

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CONTENTS

CHAPTER 1

LOCATION: TOPOGRAPHY AND LOCAL EFFECTS

1-1. General Discussion

a. Scott AFB, Illinois is located at 38°33'N and 89°51'W, approximately sixteen miles east-southeast of downtown St. Louis, Missouri. The field elevation is 453 feet above sea level.

b. The topography surrounding Scott AFB is typical of the middle Mississippi Valley (See Figure 1). The base lies in a closed basin of the Kaskaskia River with elevations of over 500 feet surrounding the basin except for the small mouth of the Kaskaskia River, where it joins the Mississippi River. Elevations within the basin range from 350 to 500 feet. The basin is approximately 22 miles wide and 63 miles long with Carlyle Lake, located in the northern most portion of the basin, being the largest open body of water. Scott AFB is situated on the west bank of the basin in the Silver Creek Valley. Height contours within a fifty mile radius vary between 400 feet and 800 feet in all directions with two exceptions. To the south and southeast some terrain is below 400 feet in the immediate Kaskaskia River area, and 50 miles to the southwest, contours approach 1000 feet, representing the beginning of the Ozark mountains.

c. Orographic effects due to the proximity of the Ozark mountains in Missouri, and two hills in the local area occasionally produce minor modification to the weather pattern. Shiloh Hill, two miles to the northwest, and Turkey Hill, five miles to the south southwest, rise some 200 feet above the field elevation. These two hills can keep the field above minimums if the wind comes downslope from these hills. Otherwise, for all practical purposes, the orographic modification of the general weather patterns within a 25 mile radius of Scott AFB is a minor consideration.

d. The most significant large bodies of water having an effect on the local weather are the Great Lakes situated approximately 250 miles to the north and northeast and the Gulf of Mexico approximately 550 miles to the south. Locally the Mississippi River flows southward across the area, passing along the eastern edge of St. Louis; the Missouri River crosses the northwestern portion of the area and empties into the Mississippi River a short distance north of St. Louis. Smaller streams in the local area are Silver Creek and Loop Creek. Silver Creek is located one mile to the east and Loop Creek is located two miles to the south; on cold clear nights steam fog forms over these moisture sources and occasionally drifts over the field in patches. These patches can obscure portions of the runway, but rarely affect the prevailing visibility.

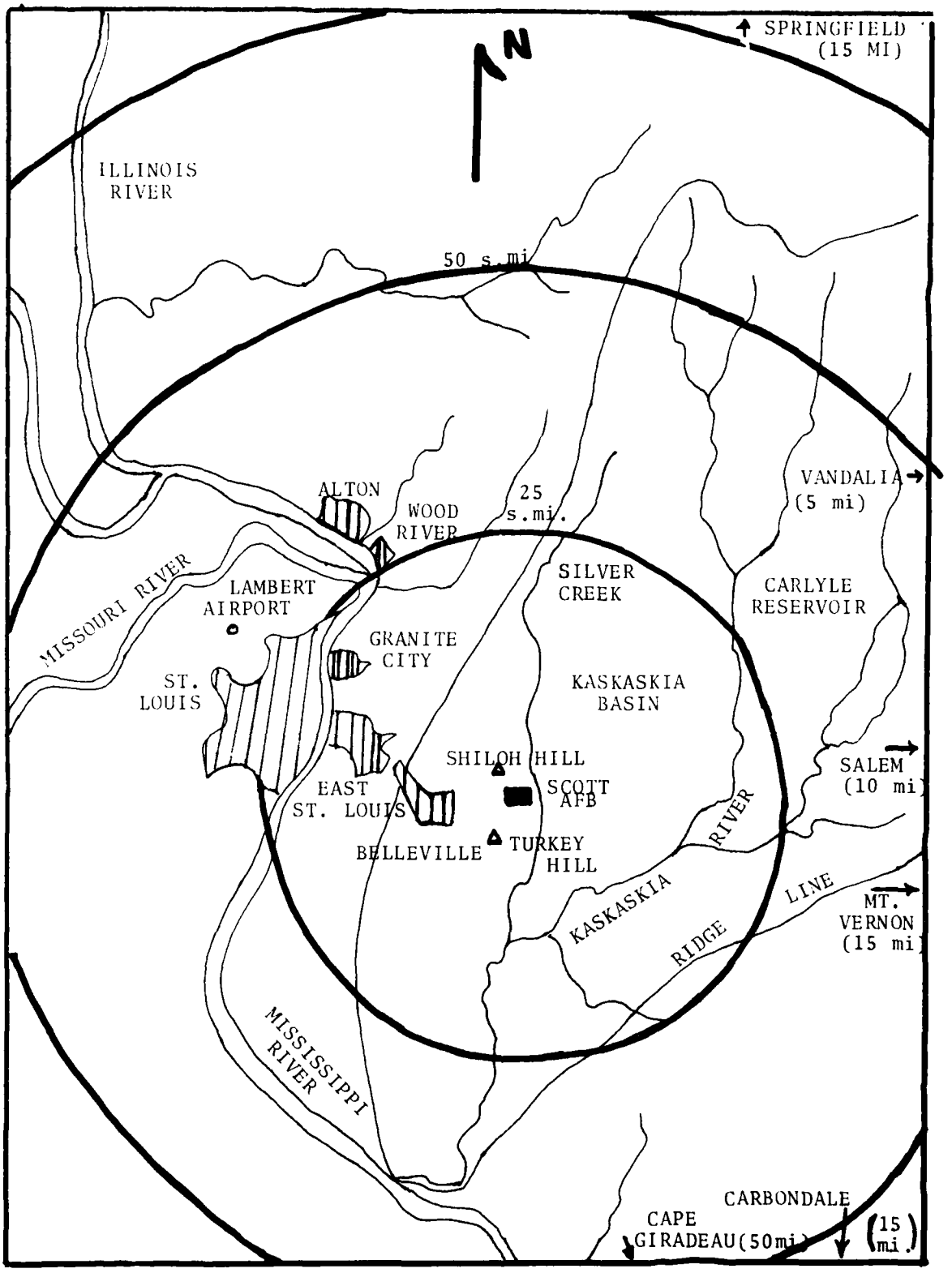


FIGURE 1
SCOTT AFB AREA TOPOLOGICAL MAP

1-2. Air Pollution Sources

a. Scott AFB is affected primarily by industrial pollution sources located 25 miles to the west through the northwest of the field. Pollutants from this relatively dense complex of industrial plants, plus the pollutants from vehicles, can lower the prevailing visibility to 2 to 5 miles. The most significant of these industrial sources are plants in East St. Louis and Granite City. Less important sources are in Alton, and Wood River, Illinois and St. Louis, Missouri (See Fig 1). The small towns surrounding Scott AFB within 5 to 10 miles furnish insignificant amounts of pollutants.

b. The base heating plant makes a minor contribution to pollution, however the hygroscopic nuclei furnished by the combustion of oil are of greater importance in lowering visibilities with fog than with smoke.

c. The widespread agricultural community is also a significant source of particulate material.

1-3. Physical Location of the Weather Station and Equipment.

a. The Base Weather Station (BWS) and the observation site are located at the ground level of the east side of Hangar No. 1 (Bldg 433). This location results in an obstructed view of the western quadrant. Control Tower personnel assist the observer in obtaining a representative observation whenever the situation requires assistance.

b. Temperatures and dew points are measured by the AN/TMQ-11 which is situated over the grass covered surface between the taxiways Lima (L) and Bravo (B). An eight inch rain gauge is located 55 feet to the east of the weather station. Instruments for measuring cloud height (AN/GMQ-13, Rotating Beam Ceilometer), winds (AN/GMQ-20, Wind Velocity and Direction), and runway visibilities (AN/GMQ-32, Transmissoneter) are located at both ends of runway 13-31 (See Fig 1-2). The AN/GMQ-13 has a 400 foot baseline and measures cloud heights from 100 feet to 3800 feet. The AN/GMQ-20 is positioned 500 feet from the center line at each end of the runway. The AN/GMQ-32 has a 500 foot baseline and measures visibilities from approximately 2 miles to less 1/4 mile. The readouts from this equipment are remoted to the BWS and the readings are considered to be representative.

c. The FPS-77, Storm Detection Radar, is used to provide an accurate three-dimensional presentation of the precipitation areas within a radius of 120NM from the BWS. The main console of the radar set is located in room #137 of Hangar No. 1 while the tower, antenna and modulator are located approximately 1500 feet SSW of Hangar No. 1 (See Figure 2). The operation of the FPS-77 radar is described in T.O. 31M6-2FPS 77-25-3. FMH-7 Part C, and local DOI's.

d. The Arthur D. Little Lightning Detector is used to aid in detecting lightning within 40NM of the airfield. The antenna and corona current point are located atop Hangar No. 1 while the main readout cabinet is located in the forecast briefing area (room 135, Bldg. 433). The 40NM channel is so sensitive, that arcing from a light sometimes causes it to discharge. Snow showers will also affect the Coronal Detector. Operation of the Lightning Detector is described in Final Report of the Detector of Atmospheric Electrical Disturbances.

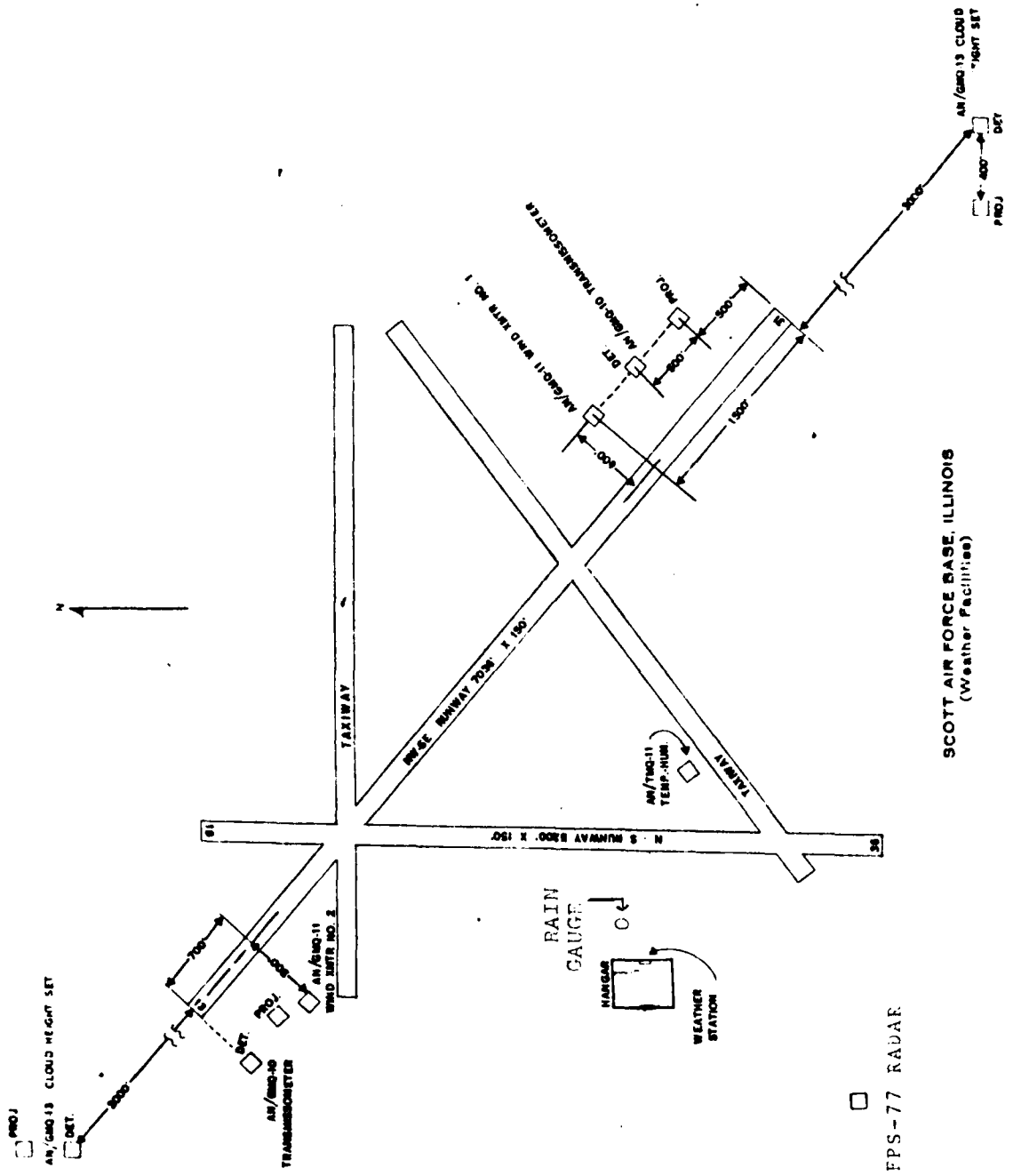


FIGURE 2
SCOTT AIB WEATHER EQUIPMENT LOCATION

CHAPTER 2

SYNOPTIC CLIMATOLOGY

2-1. General Synoptic Features

a. The middle Mississippi Valley of the United States is subject to a broad range of weather, both inclement and pleasant. Scott AFB, with its location in the central portion of this valley, experiences this broad range of weather at one time or another during the four seasons of the year.

b. Air masses of both polar and tropical origin strongly influence the weather here. Although some types are more common to the area than others, the base is affected by mT, mP, and cP (or cA) air masses. These air masses seldom arrive a Scott AFB without some modification but each type has identifying characteristics with respect to resulting weather at the base.

c. Cyclones, with their associated frontal systems, usually have a direct effect upon the weather at Scott AFB as they move across the U.S. As might be expected, these systems change the weather most intensely and most often during the winter season while the least influence is noted during the summer.

2-2. Seasonal Synoptic Features.

a. Winter (December, January, February, March)

1) The winter season at Scott AFB is characterized by relatively frequent periods (once a week) of inclement weather that affects ground and aircraft operations. During this season the greatest variety of weather occurs at Scott AFB, often featuring rapid and frequent changes from one type of regime to another, especially with respect to temperature and precipitation types.

2) Cyclones passing north of Scott AFB generally produce weather conditions at the base more favorable to local flying than those passing south. Two significant prefrontal conditions for which the forecaster must be alert are (1) the development of migratory Gulf stratus and its associated high pressure system and (2) squall line thunderstorm activity usually associated with a mP cold frontal passage. The first condition is relatively common during the winter but forecasting its arrival at Scott AFB is seldom a simple task. After deciding whether or not such clouds will spread northward from the Gulf region, a positive decision will then require an evaluation of other factors determining their time of arrival at the base. One method of estimating the arrival time of the stratus is, if the high pressure system is in the SE (usually over the Georgia/Alabama area), forecast the stratus to advect into the Scott AFB area 20-24 hours after the stratus ceiling appears in Houston, Texas. Some other factors which must be considered are the influence of the Ozarks, the time of day, the duration of the southerly flow, etc. Gulf stratus ceilings are usually observed between 1500 and 5000 feet and can be quite persistent. (See Figure 3)

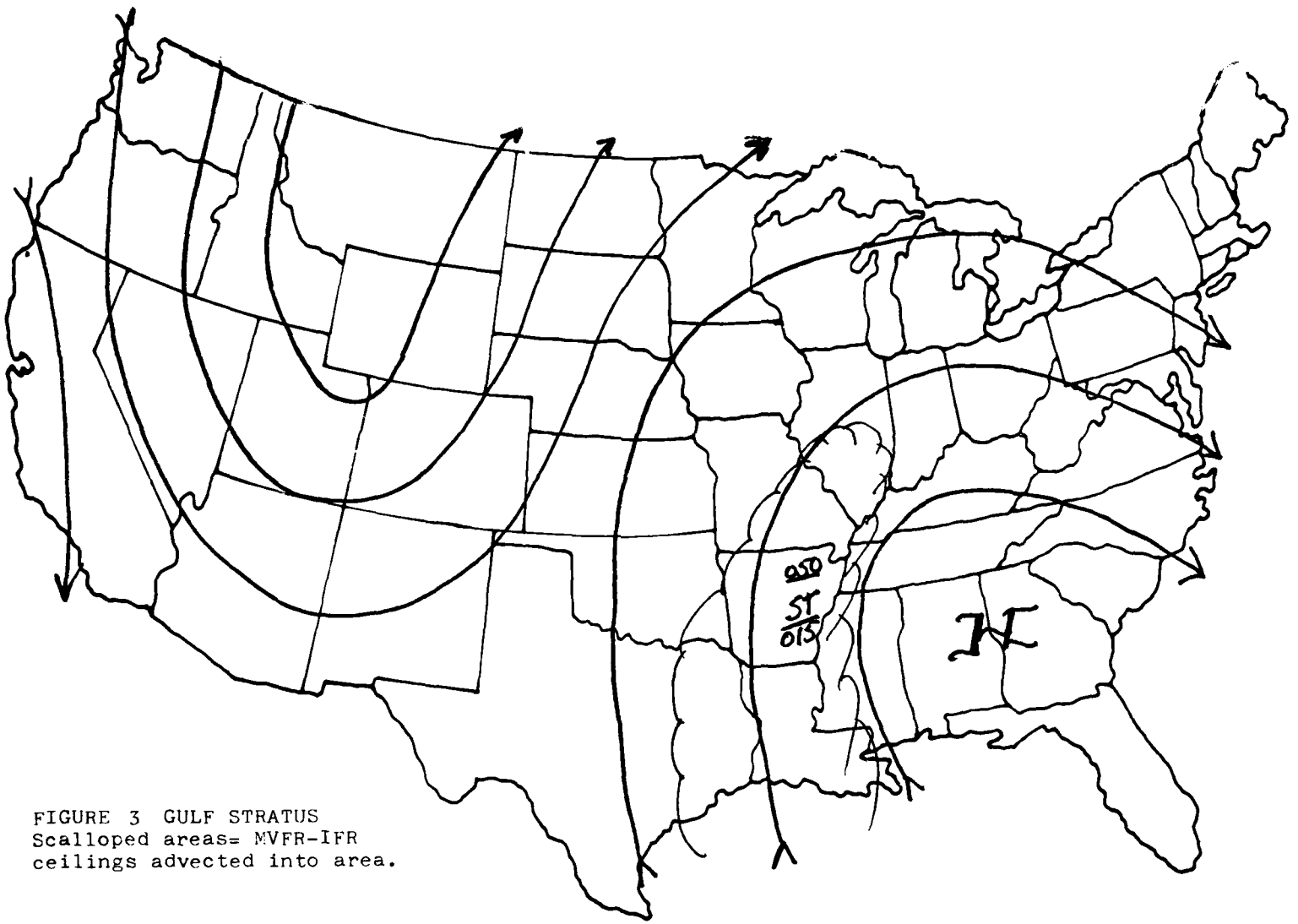


FIGURE 3 GULF STRATUS
Scalloped areas= MVFR-IFR
ceilings advected into area.

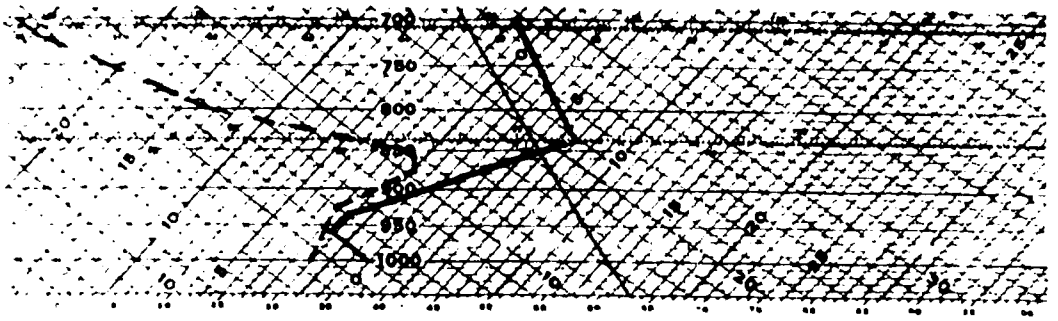


FIGURE 4
SKEW-T SOUNDING
FOR POSTFRONTAL STRATOCUMULUS

3) Forecasting postfrontal weather associated with cyclones passing north of Scott AFB during this season involves a determination of (1) the advection of moisture from the Great Lakes region, (2) the proximity of the cyclone to that region, and (3) the intensity of the cyclone. Well developed cyclones passing very near or over the Great Lakes will often produce stratocumulus ceilings at Scott AFB, generally between 1500 and 5000 feet. (See Figure 5). Depending on temperatures, stability, etc, snowshowers sometimes develop which result in rapidly fluctuating ceilings and visibilities at the base. Intermittent conditions can often be quite low. If the cyclone decelerates and deepens over the Great Lakes, postfrontal conditions at Scott AFB can persist for extended periods. Postfrontal stratocumulus is most predominate in the late fall, winter, and early spring. It can develop up to 24 hours after FROPA and persist up to 4 days. The moisture source is the Great Lakes and residual moisture from the Gulf of Mexico. The sounding above shows the height and type of inversion.

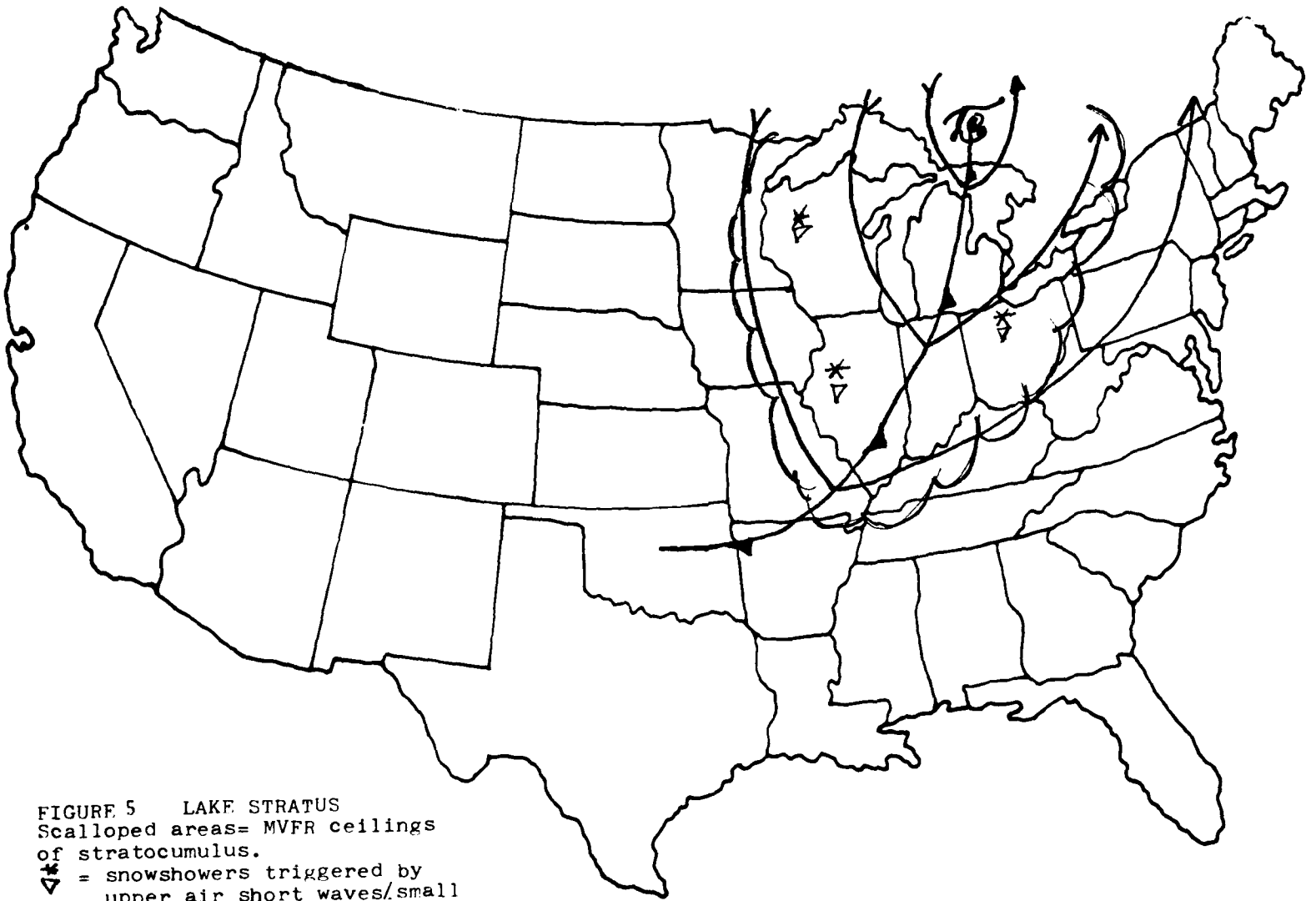


FIGURE 5 LAKE STRATUS
Scalloped areas= MVFR ceilings of stratocumulus.
* = snowshowers triggered by upper air short waves/small surface troughs traveling through contour pattern.

4) A second postfrontal condition of importance concerns the forecasting of fog formation after the postfrontal stratocumulus has scattered out. The cold continental air mass behind the cold front will generally be colder than the water sources within the Kaskaskia River Basin. When normal radiational cooling is established during the nighttime hours, cold air drainage results throughout the basin. As the cold air drains off the water sources, a combination of radiation and steam fog will tend to fill up the basin. The fog will first form immediately along the Kaskaskia River and spread along the sides of the basin approaching Scott AFB from the southeast. Winds are usually calm throughout this process and may become southeasterly at 1-2 knots as the fog moves in. Below minimum conditions are frequent with this situation. Once Scott AFB has gone below minimums in fog during the morning, forecast the fog to begin lifting when the surface temperature becomes moist adiabatic to the top of the inversion. This condition may persist for several days with steadily increasing minimum visibilities as the cold polar air is modified.

5) During the winter, cyclones passing to the south of Scott AFB (Refer to Figure 6) will often threaten the base with freezing precipitation and/or heavy snow. The few heavy snows that have occurred at the base are almost always caused by this type of synoptic feature. An accurate forecast of the most probable vertical temperature field is essential. In addition, cyclones passing to the south usually produce lower ceilings and visibilities at Scott AFB than those passing to the north. Ceilings generally will be less than 1500 feet and visibilities less than 3 miles.

6) The most important consideration in forecasting a heavy snow at Scott AFB with the low passing to the south of the base is its upper level (500 MB) support. If a closed 500mb low is not present, a heavy snow is very unlikely as the surface low will tend to move with only a 2-4 hour period of snowfall. If the 500mb low closes over the Scott area, the surface low may remain nearly stationary for 24 hours or more, and large snow falls may result. Another important consideration is freezing rain which can accompany any of these synoptic situations, depending on the vertical temperature profile. A closed 500mb low in the Scott area can produce a large snowfall without the presence of an accompanying surface low. (Example: 17 inch snowfall in April 1971). This situation is very unusual but should be kept in mind. Heavy snow/precipitation (4-8 inches of snow; 1-2 inches of rain) will occur:

a) When the upper low passes over Scott AFB and the surface low passes just south of Scott AFB.

b) When the surface low passes to the south of the Boston Mountains in Arkansas; the heaviest precipitation will be to the south of Scott AFB.

c) The surface analysis in Figure 6 shows the position of the low 6-12 hours before the onset of heavy precipitation.

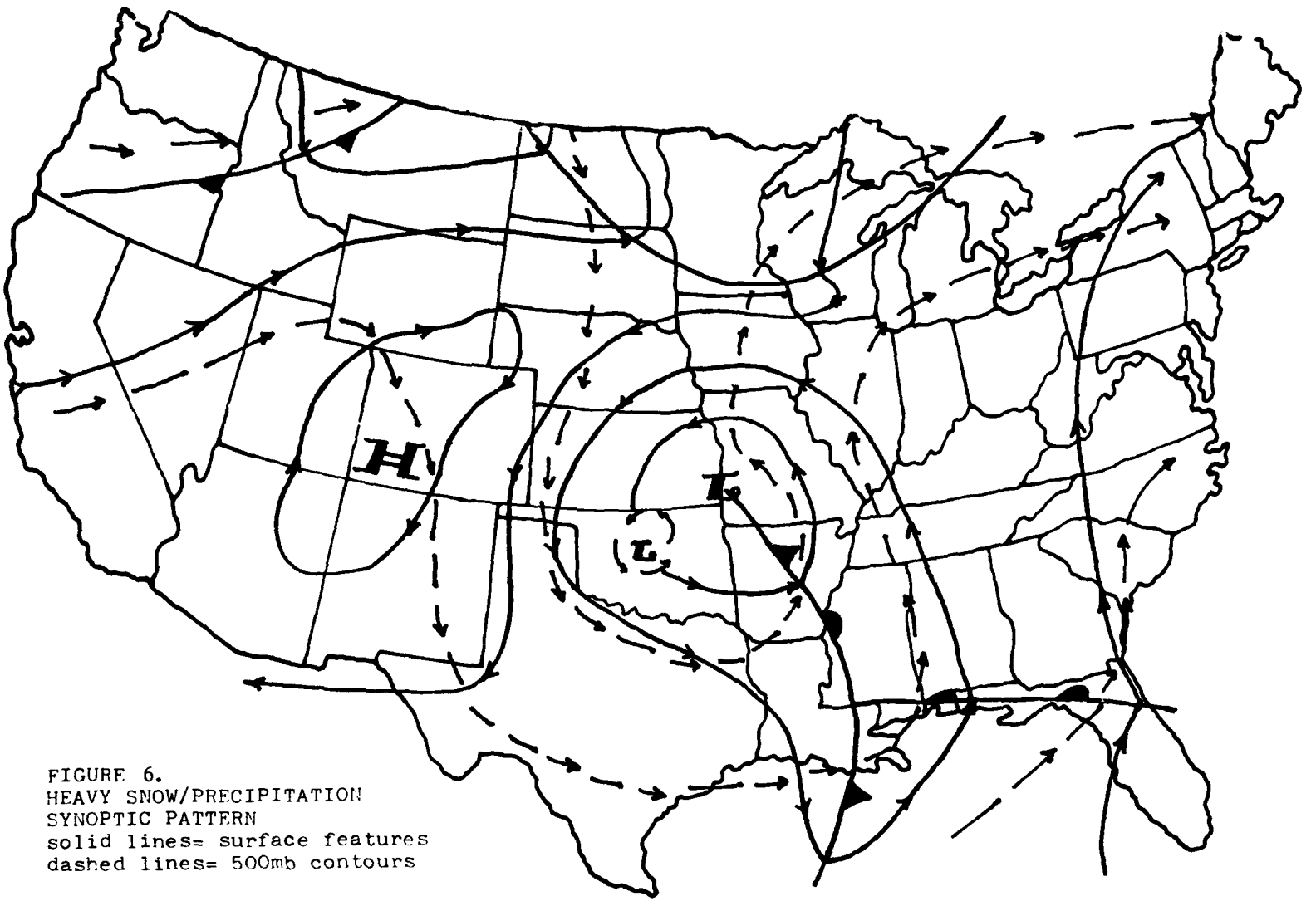


FIGURE 6.
HEAVY SNOW/PRECIPITATION
SYNOPTIC PATTERN
solid lines= surface features
dashed lines= 500mb contours

techniques and problems are also discussed.

7) Ceilings and visibilites at the base usually improve as a southern cyclone moves rapidly eastward beyond 150-200 miles of Scott AFB. If the cyclone is moving northeastward and remains within 200 miles of Scott AFB, improvement will be much slower.

8) An important source of low ceilings and visibilities during the cold winter months (January-March) is the warm frontal stratus produced by overrunning of warm, moist Gulf air over much colder arctic air. If the front moves through the area, then only 2-3 hours of low ceilings and visibilities will result, with rapid clearing south of the front. If the front stagnates in our area the low stratus can remain for several days with associated drizzle. A good key to forecasting the stratus formation is to see if the dewpoints south of the front are greater than the free air temperatures north of the front.

9) The Texas wave frontal system causes long periods of precipitation, low ceilings, and low visibilities. The conditions that are most favorable for its formation are a stationary continental polar front situated northeast-southwest through the southern states and west through Texas, or a polar front that has become stationary through Illinois, Missouri, Oklahoma and then into Texas. With the intrusion of a new continental polar high moving south out of Canada along the Rockies, or a strong maritime polar high moving southeast across Utah and New Mexico, and a strong southerly flow of warm, moist maritime tropical air from the Gulf of Mexico up through the Gulf States into the Arkansas-Tennessee area, this wave will form. Usually the starting point of the low pressure cell is in the Texas panhandle area or the southwestern Texas and eastern New Mexico area. (See Figures 7, 7a, 7b, and 7c).

a) When the wave is still to the southwest of the station, Scott AFB experiences overrunning conditions. Usually broken to overcast cirrus with increasing altostratus prevails. The altostratus deck continues to lower as the warm front approaches Scott AFB and can be forecast if a close check is kept on the stations to the south and southwest of this station. With the low still 18 hours away, or usually in northeast Oklahoma, conditions at this station rapidly deteriorate. Ceilings are generally one thousand feet or less. Visibilities are less than 2 miles in fog. Rain, drizzle, snow, freezing rain or freezing drizzle can occur, depending on the temperature of the layer of cold air on the surface. These conditions will continue until the low has passed well into eastern Ohio or southern Ontario. Winds will be north through northeast at this station during the entire track of the wave.

b) The movement of the wave can be forecast with the flow at 700mb until the low passes into Ohio or Pennsylvania, and its velocity is very uniform. Occasionally, the wave will move north of Scott AFB while still west of the station. When this occurs the warm front will pass immediately. Conditions improve to scattered to broken altocumulus and scattered stratocumulus with visibilities greater than 5 miles. Within 8 to 12 hours after the warm frontal passage,

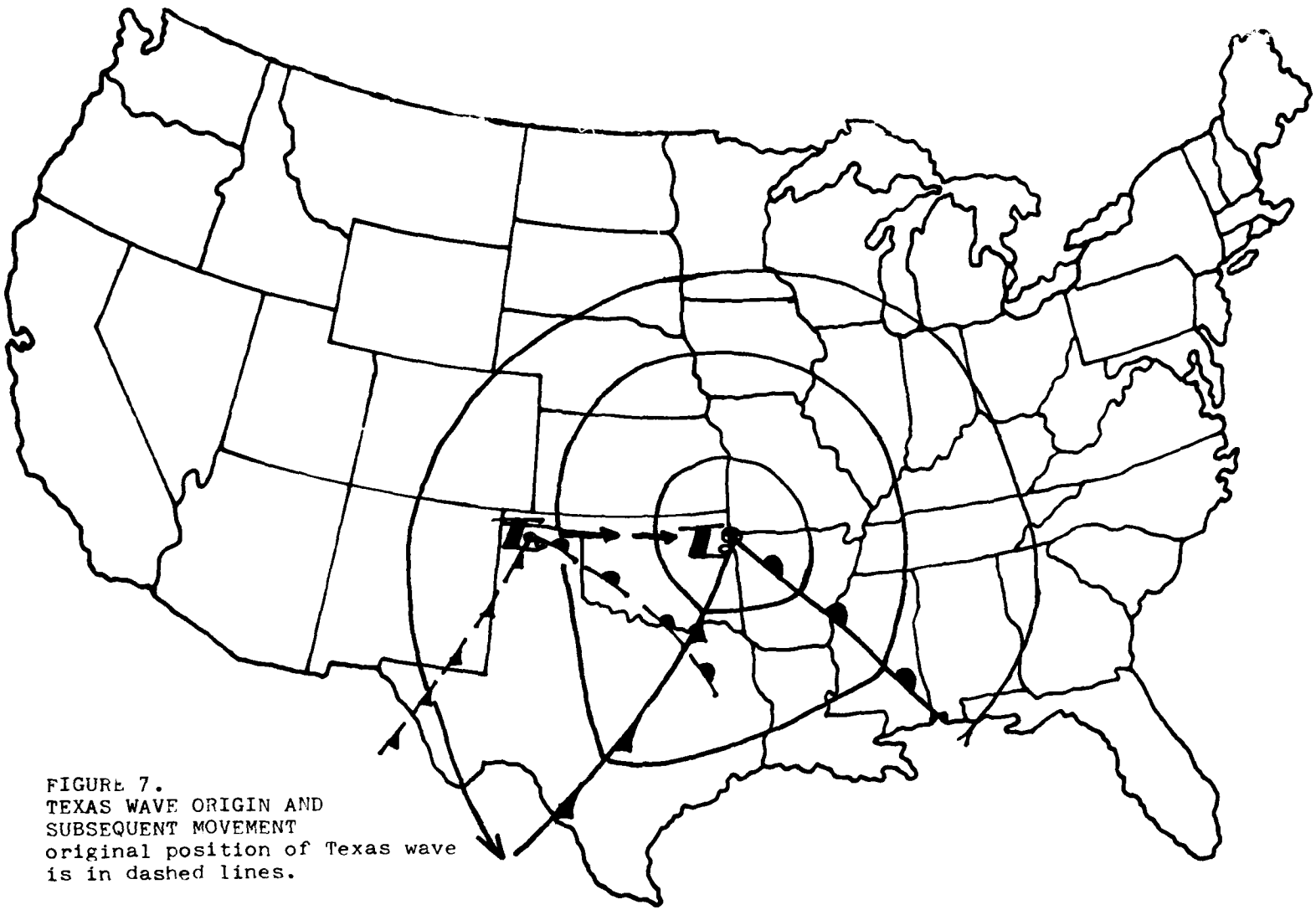


FIGURE 7.
TEXAS WAVE ORIGIN AND
SUBSEQUENT MOVEMENT
original position of Texas wave
is in dashed lines.

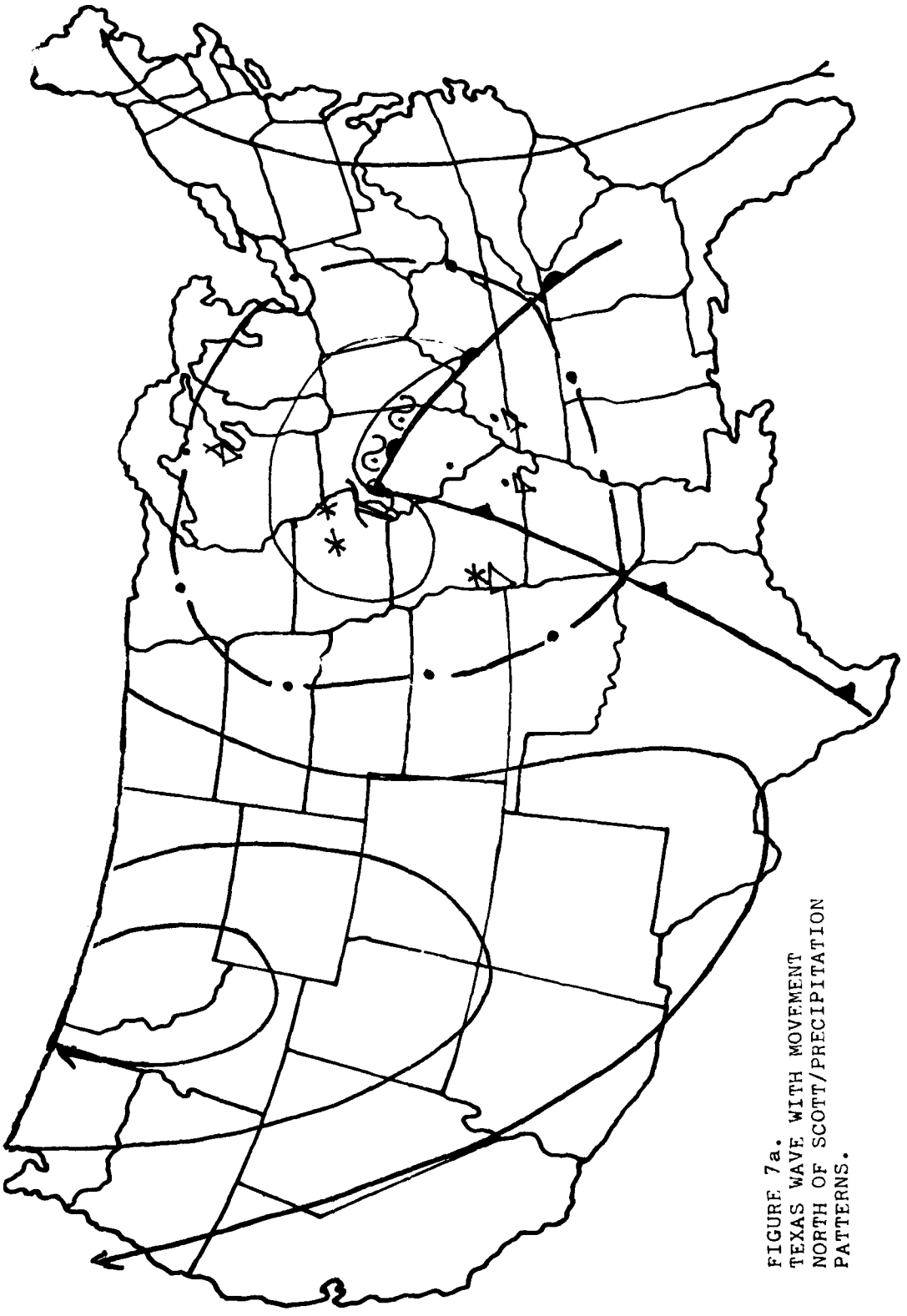


FIGURE 7a.
TEXAS WAVE WITH MOVEMENT
NORTH OF SCOTT/PRECIPITATION
PATTERNS.

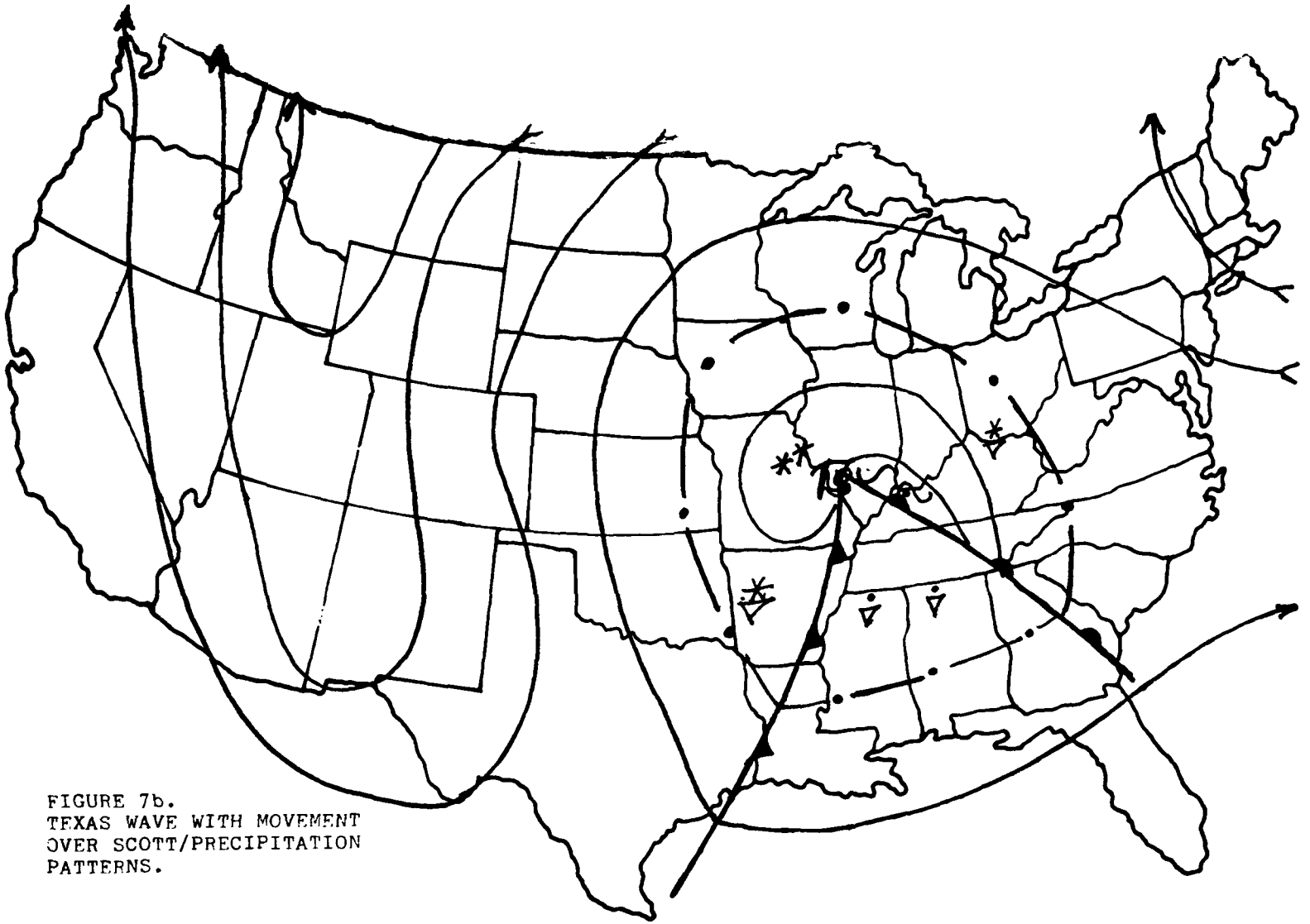


FIGURE 7b.
TEXAS WAVE WITH MOVEMENT
OVER SCOTT/PRECIPITATION
PATTERNS.

FIGURE 1
SCOTT AFB AREA TOPOLOGICAL MAP

1-2

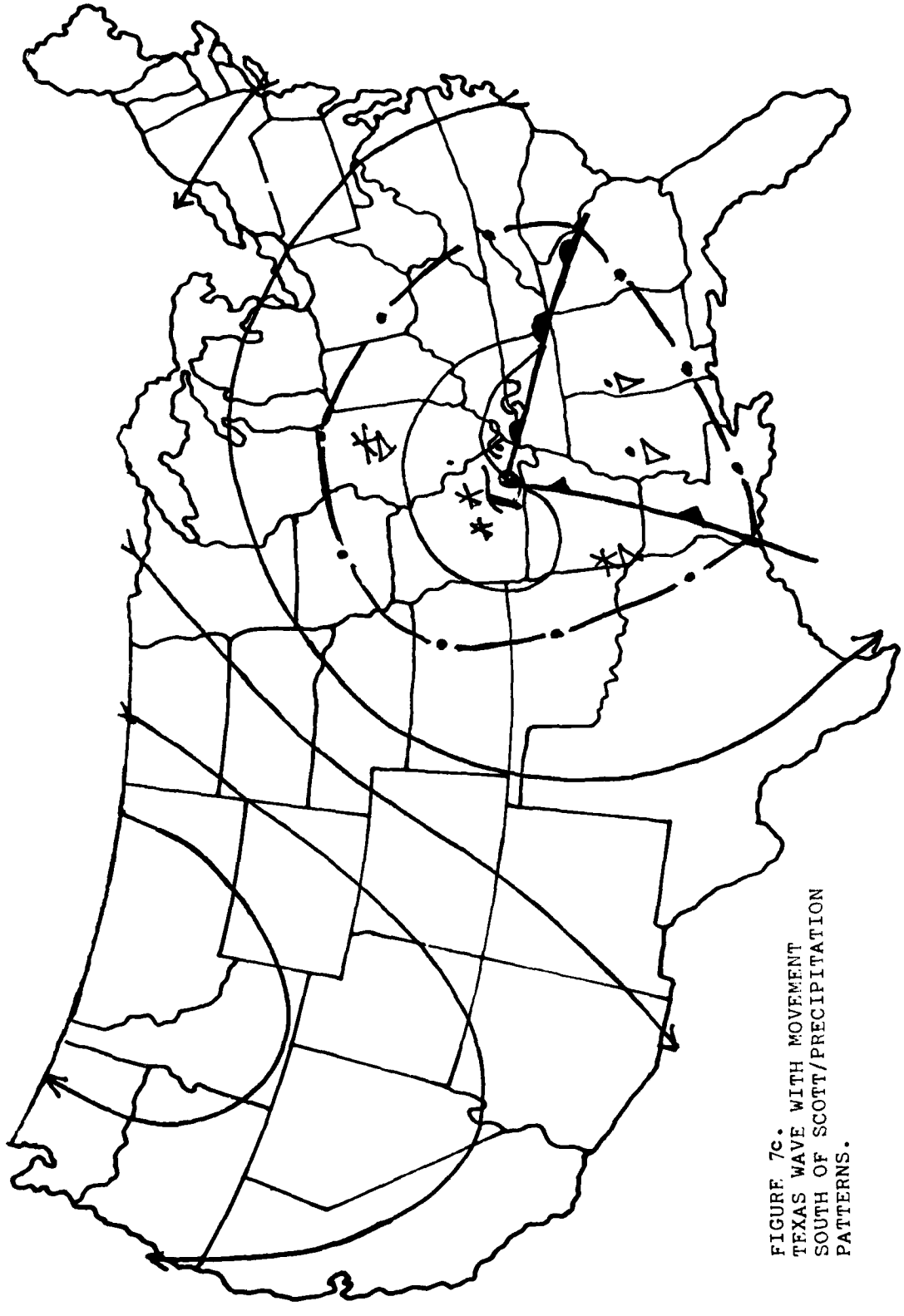


FIGURE 7c.
TEXAS WAVE WITH MOVEMENT
SOUTH OF SCOTT/PRECIPITATION
PATTERNS.

2-11

the cold front will pass this station, placing Scott AFB once again in the cold air with the same poor weather conditions described in the preceding paragraph. The movement north and west of the station can be forecast if a close check is kept on the trough movement at 850mb and 700mb and the strengthening of the ridge along the east coast.

10) With a Maritime Polar Front 500 miles west of the station, the observed cloudiness will be scattered to broken altocumulus and scattered cirrus. As the front approaches within 300 miles of the station, a lower deck of stratocumulus will be observed, usually overcast, but with occasional broken conditions during the night time hours. Light showers can be expected as far as 300 miles ahead of the front. Ceilings in this stratocumulus deck will be near 5000 feet while the front is more than 300 miles away from the station, and will gradually lower to 1000 feet or less for the 8 to 12 hour period preceding frontal passage. With frontal passage, the lower deck of stratocumulus will move eastward and an upper deck of altocumulus and altostratus will prevail at 7000 to 10,000 feet. Visibilities will be 7 miles or more until within 8 hours of frontal passage then lower to as low as 1 mile in fog or drizzle. Immediately following frontal passage, visibilities will improve rapidly to 7 miles or more. (See Figure 8).

a) Temperature and dewpoint contrasts across the front seem more important to associated weather with the front than do the absolute values of temperature. Temperatures in maritime polar air can vary widely from season to season from the eighties in the summer to the twenties in the winter. Dewpoints are usually quite low regardless of the season due to adiabatic warming as the air pushes down the eastern slopes of the Rockies and usually becomes indistinguishable from modified continental polar air.

b) Associated frontal cloudiness and precipitation will be greatly enhanced by large temperature gradients across the front. Another factor which will greatly increase frontal activity is high dewpoints in the air mass south of the front.

c) The higher dewpoints of course are associated with maritime tropical air as opposed to modified continental or maritime polar air that has moved south over the Gulf. The moisture available south of the maritime polar front will be the major determining factor on cloud and precipitation formation with the front.

11) With the Continental Polar Front 250 miles away fron the station, generally fair weather conditions exist at this station. Occasionally with strong, unstable air over the station preceding frontal passage, there will be some cumulus activity with showers and possible thunderstorms (thunderstorms predominantly March through September). (See Figure 9).

a) Visibilities are excellent and average 7 miles or more. As the front approaches to within 100 miles of the station, a band of altocumulus, usually spreading 80-100 miles ahead of the front, will be observed. This deck will remain broken to overcast up to the frontal passage at heights of 8,000 to 12,000 feet.

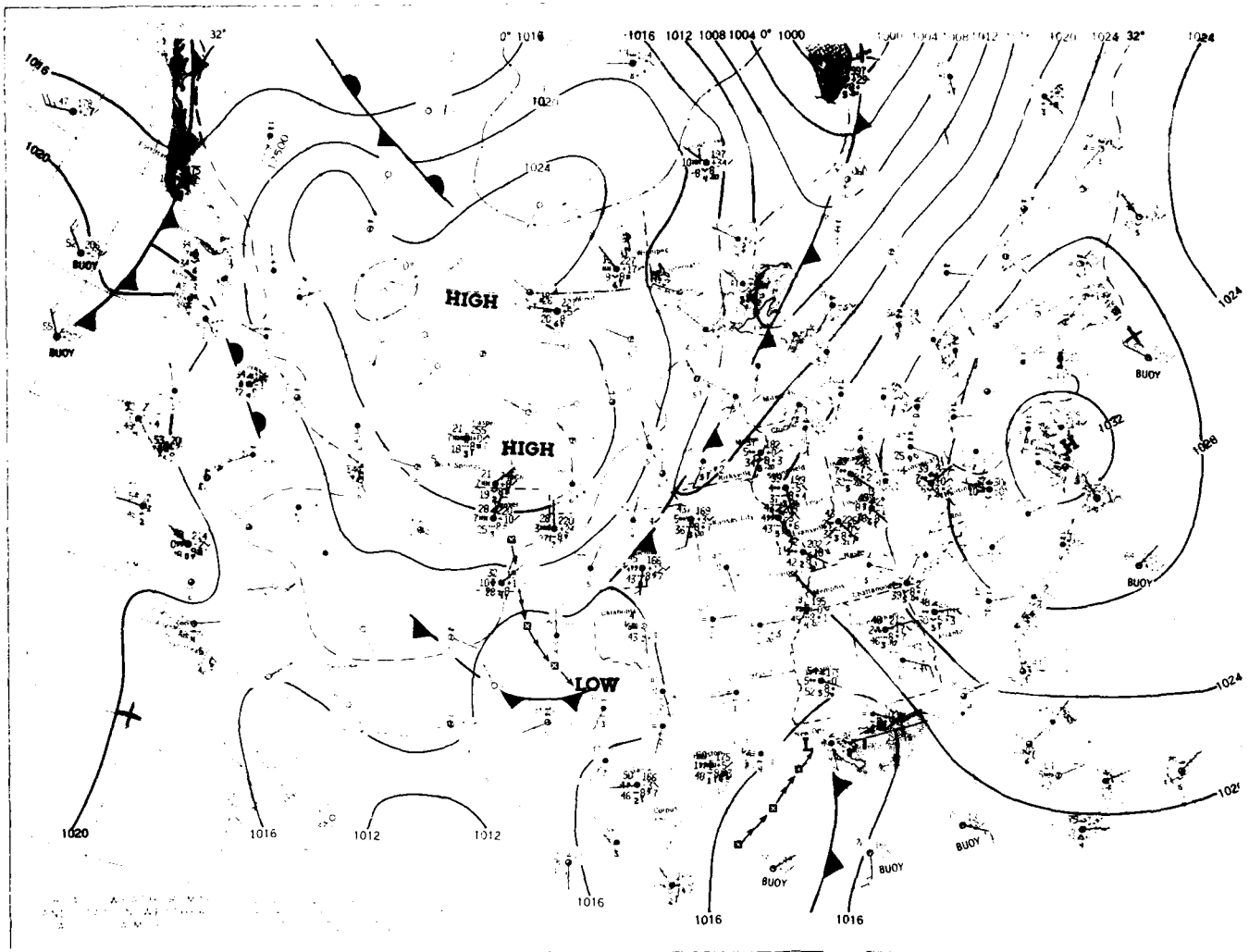


FIGURE 8.
MARITIME POLAR FRONT
WITH ASSOCIATED PRECIPITATION PATTERNS

SCOTT AIB WEATHER EQUIPMENT LOCATION

1-5

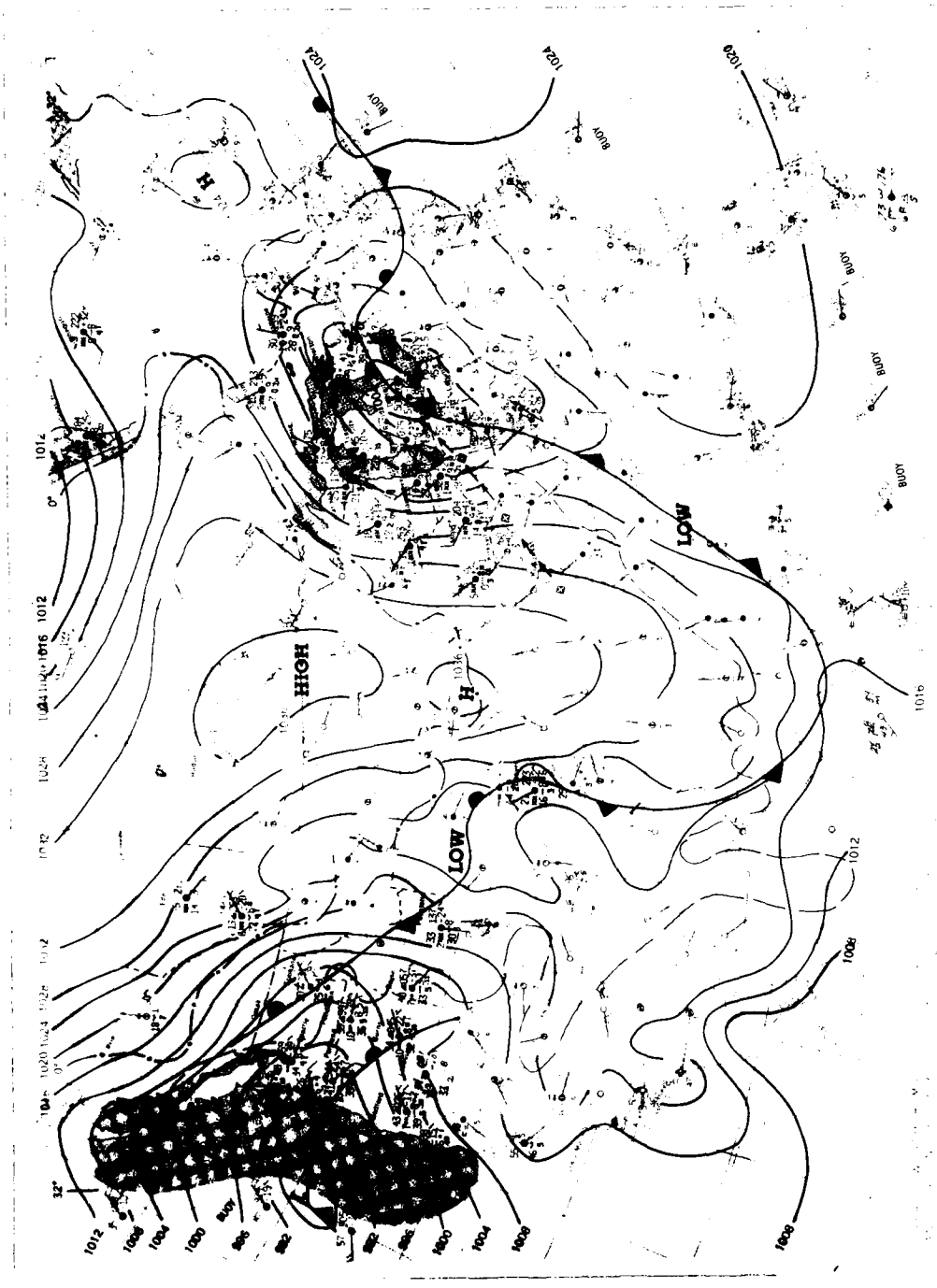


FIGURE 9.
CONTINENTAL POLAR FRONT
WITH ASSOCIATED PRECIPITATION PATTERNS

2-14

b) As the front approaches to within 80 miles of the station, a deck of stratocumulus broken to overcast will dominate with ceilings 5000 to 7000 feet gradually lowering to 1000 feet or less at frontal passage.

c) If the continental polar air mass is moist, the stratocumulus deck will persist with ceilings 1500 to 5000 feet remaining over the station 12 to 24 hours after frontal passage.

d) Visibilities are generally 5 miles or less from 8 hours prior to frontal passage, then generally 2 miles or less for 2 to 5 hours after the frontal passage.

e) Temperature and dewpoint contrasts across the front are more significant than the mean values in the air masses alone as far as associated frontal weather is concerned, but temperature and dewpoint ranges will be given as general information. Temperatures behind the front can range from 60°F in the summer during an infrequent southward movement of polar continental air to temperatures as cold as -20°F during the winter. Dewpoints are typically low, varying from 0°F to 20°F, with values increasing as modification occurs as the system moves across the Great Lakes. The most active frontal systems will be those with the greatest temperature contrast and highest dewpoints to the south of the front.

12) On the average, the base is usually affected about every three days by a cyclone and an associated cold frontal (mP or cP passage. (See Figures 8 and 9). The most basic problem facing the forecaster is a determination of whether the cyclone will pass to the north or south of Scott AFB because two different general weather patterns will result at the base depending on the path. (See Texas Wave illustrations-Figures 7, 7a, 7b, and 7c). Climatologically, many more cyclones pass to the north of Scott AFB than to the south, the ratio being greater than four to one during the winter. However, those passing south are inherently linked to the most serious forecasting problems during this season. Therefore, the future path of any cyclone to the west of the base must be carefully considered in forecasting for Scott AFB.

13) The second prefrontal condition, squall line thunderstorm activity, occurs only a few times each winter but these thunderstorms may be severe. (Refer to Figure 9). Since winter season cyclones and their associated upper air features are generally very intense, the critical factor for the determination of thunderstorm activity usually centers around air mass stability. Of the four months comprising this season, March usually features the most prefrontal thunderstorm activity, particularly during the last half of the month.

14) One other prefrontal condition which must be considered is the possibility of strong and gusty surface winds. Although gusts exceeding thirty knots are much more common with westerly through northerly winds (postfrontal conditions), cases do occur in southerly flow. One method for forecasting gradient gusts over 25 knots is to use the FDUS winds at 3000 and 6000 feet and the formula of 4/10 (3000 foot + 6000 foot winds). This formula works as long as the skies are not cloudy.

15) In Figure 10 is an example of the extreme cold synoptic pattern for Scott AFB. This synoptic pattern is 18-30 hours before the coldest temperatures at Scott AFB. An indication of an impending cold wave is a strong 500mb pressure low over the Hudson Bay. During this period, several troughs of colder air will flow down from Canada as a 500mb long wave ridge builds over the Rocky Mountains. The coldest temperatures will generally occur 36-73 hours after this frontal passage.

16) Precipitation is moderate and evenly distributed in winter, averaging about 2.64 inches a month with occurrences on 9 days per month. Measurable snow cover occurs on about 2-3 days per month resulting in an average of 3.8 inches of snowfall per month. January is the leading snow month with 5.0 inches. Monthly totals have been as high as 23.2 inches (March) and 24-hour totals as great as 13.6 inches (December 1973). Freezing rain and drizzle occur less than one day per month except in January which has an average of 1.64 days per month. Thunderstorms occur about once a month except during March which has 3 days with thunderstorms. Severe thunderstorms with tornadoes are possible, but rare during the first three months. However, March is the highest month of the year for tornadoes in southern Illinois (based on the distribution for Illinois during the period 1916-1969) with about 3% of all the tornadoes reported.

17) Diurnal minimum temperatures for winter average below freezing for the months of December, January, and February. Freezing temperatures occur 23 days in December, 25 days in January, 21 days in February, and 14 days in March. Even though 14 days in March are 32°F or colder, the average low is 34°F. The extreme low is -19°F which occurred in January. While the overnight lows average below freezing, temperatures usually climb to around 40°F by early afternoon. March is the exception with the average low of 34°F climbing to a mean high of 53°F.

18) Dense fog sufficient to affect surface operation (visibilities less than 1/2 mile) occur about 2% of the time mostly around sunrise during the winter. Smog and haze occur frequently during winter months, but rarely restrict the visibility below 3 miles during the day, 5 miles at night, and 1-2 miles at sunrise and sunset.

19) Although winter weather is the poorest of the year, IFR flying at Scott AFB is not generally hampered by weather. Several days of postfrontal stratocumulus with bases at 1500 feet and tops at 4000 feet are common. Relatively light icing is usually encountered when descending through this stratocumulus layer. The C-C tables should be consulted and heavily weighed when forecasting dissipation of this low cloud layer. Overrunning warm moist air over trapped cold air usually lasts for 2 or 3 days when it occurs, and can cause below minimum conditions. Moderate icing is possible when flying through the layered clouds associated with this overrunning situation. Thunderstorms are usually isolated during the winter, but are sometimes imbedded in layered clouds associated with warm frontal weather. The majority of the wind speeds over 27 knots occur during the winter; however, most of these speeds are associated with northwest winds which have the same general orientation of the main instrumented runway (13-31).

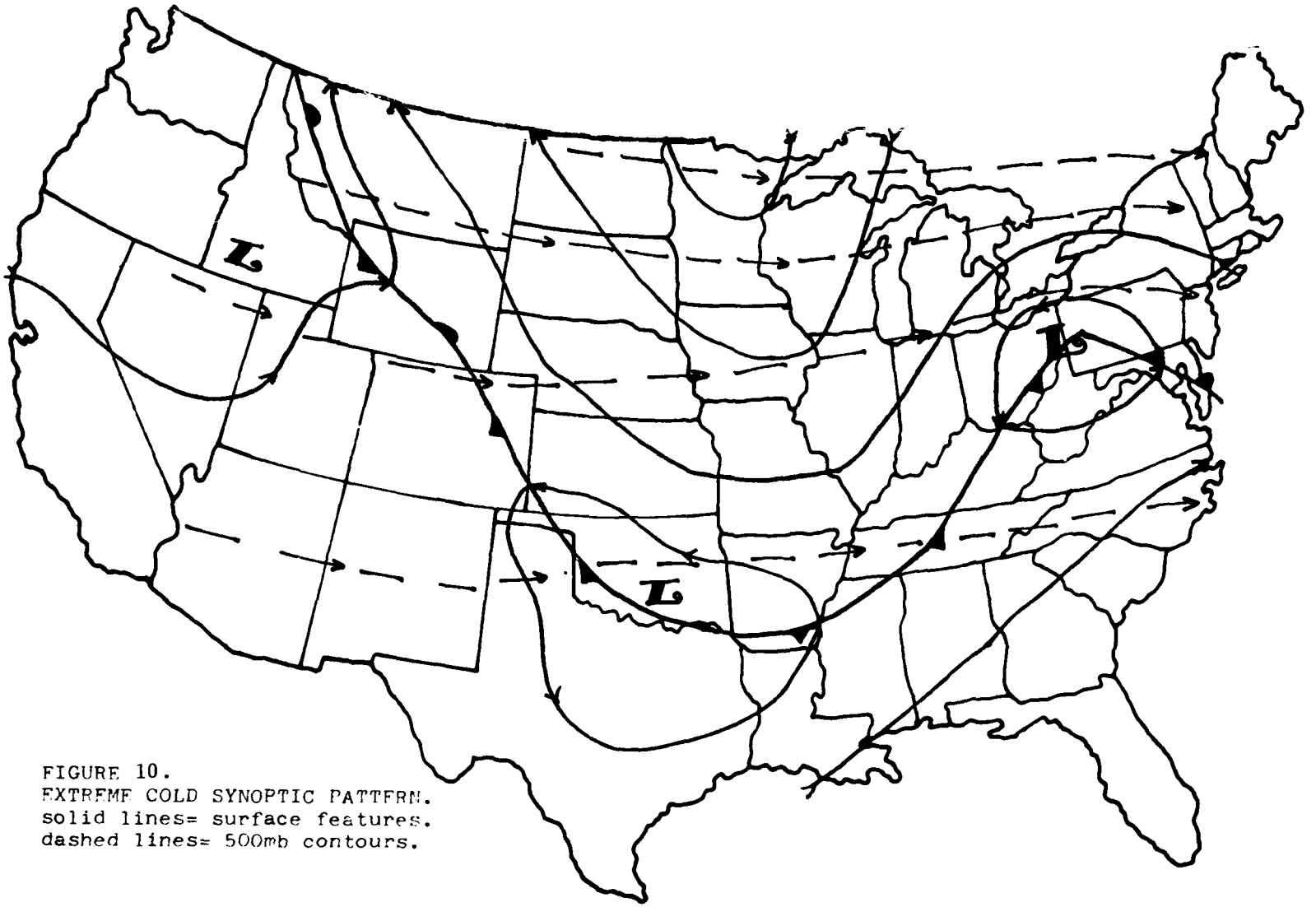


FIGURE 10.
EXTREME COLD SYNOPTIC PATTERN.
solid lines= surface features.
dashed lines= 500mb contours.

2-2. Seasonal Synoptic Features.

b. Spring (April, May)

1) The period of March through May is characterized by rapid and consistent improvement of weather conditions. The month of March, however was included under the winter brief because of the occurence of low temperatures and high snow averages.

2) The major weather problem of this season is severe thunderstorm activity. As the transition occurs from winter to summer during these two months, many cyclones and their related upper air features moving across the US are still characterized by dynamics typical of winter. With warmer temperatures and more abundant moisture available, unstable air masses are common during prefrontal conditions; squall lines frequently develop along and ahead of cold fronts to the west of Scott AFB. Such squall lines can produce very severe thunderstorms with associated large hail, high wind gusts, and tornadoes. The forecaster must always be alert to the development of prefrontal squall lines during the spring. (See Figure 11).

3) Principal cyclone tracks during the spring are located north of Scott AFB, but they are still comparatively close to the base. Poor postfrontal weather is shorter lived than during the winter although stratocumulus ceilings can occasionally be persistent. Cyclones passing south of the base are infrequent, but when they do occur, heavy rains, overrunning thunderstorms, and related low ceilings and visibilities may occur. (See Figure 12).

4) In general, low ceilings and visibilities are much less persistent during the spring as compared to the winter. The forecaster must analyze the situation carefully before deciding to continue these conditions for long periods of time.

5) Precipitation amounts increase with increased convective activity, averaging almost 4 inches of rain a month and all occurring on about 10 days a month. Thunderstorms increase in both number and intensity during the Spring. April has 6 days with thunderstorms while May has 7 days. Thunderstorms in May have caused the two peak recorded gusts (W 75 Kts.-1952 and SE 71 Kts.-1957). Besides high winds, tornado occurrence is also highest during this transition period. Based on tornado occurrence in Illinois from 1927-1952, 72% or 101 of the 140 reported tornadoes occurred from March to June (March - 31, May - 29, April - 23, and June - 18). A little more than a trace of snow is the average for the transition months of April and May, although heavy snow has occurred in April (17 inches -1971). Freezing precipitation, though very light, has occurred during April and May.

6) Average temperatures rise rapidly during this period climbing about 30 degrees. April averages about 9 hours with a minimum temperature of 32 degrees or lower. During May the maximum temperature can reach 90 degrees or higher.

7) Dense fog sufficient to affect surface operations (visibilities less than 1/2 mile) becomes increasingly rare and by May is confined to the early morning hours, burning off rapidly after sunrise.

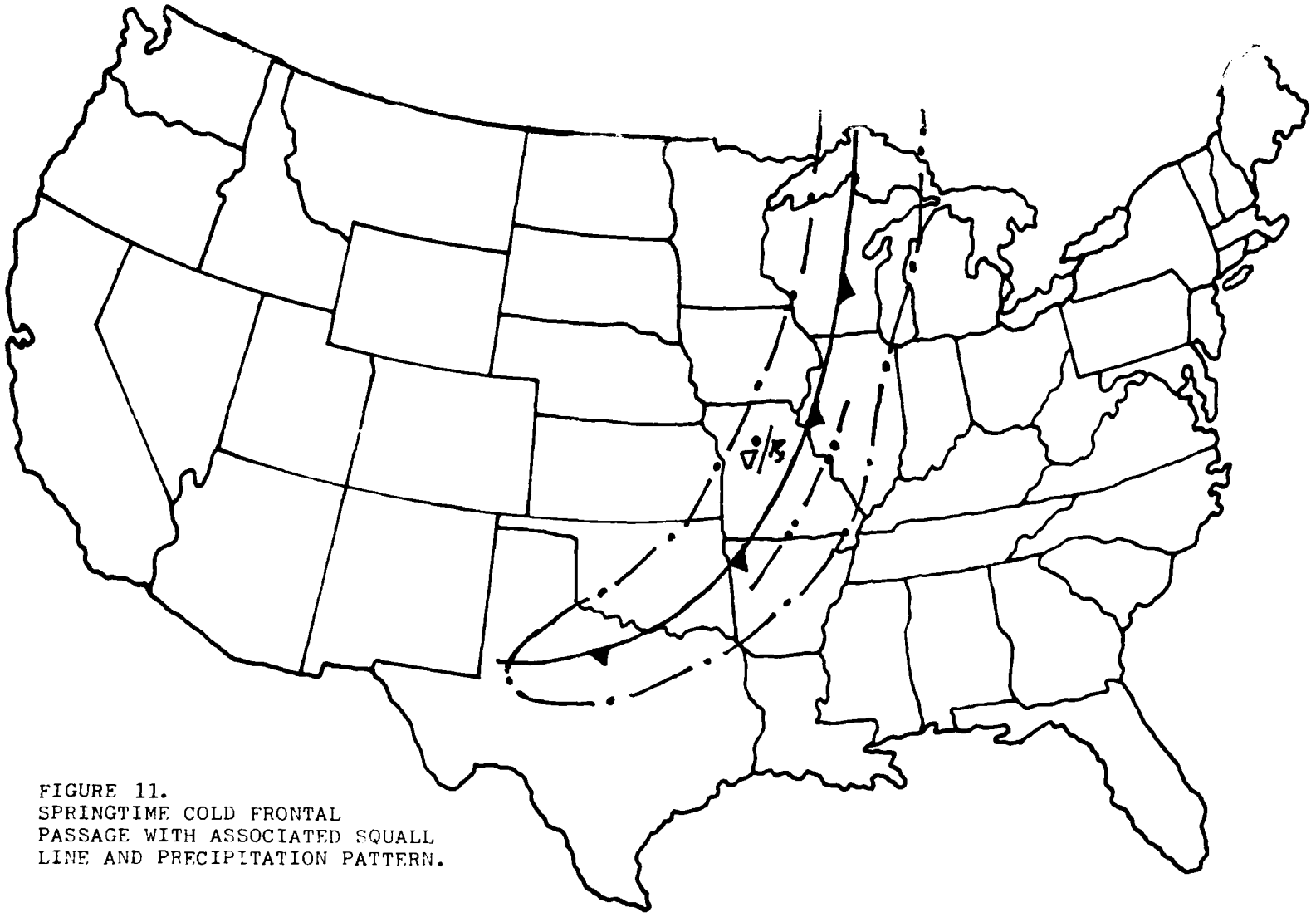


FIGURE 11.
SPRINGTIME COLD FRONTAL
PASSAGE WITH ASSOCIATED SQUALL
LINE AND PRECIPITATION PATTERN.

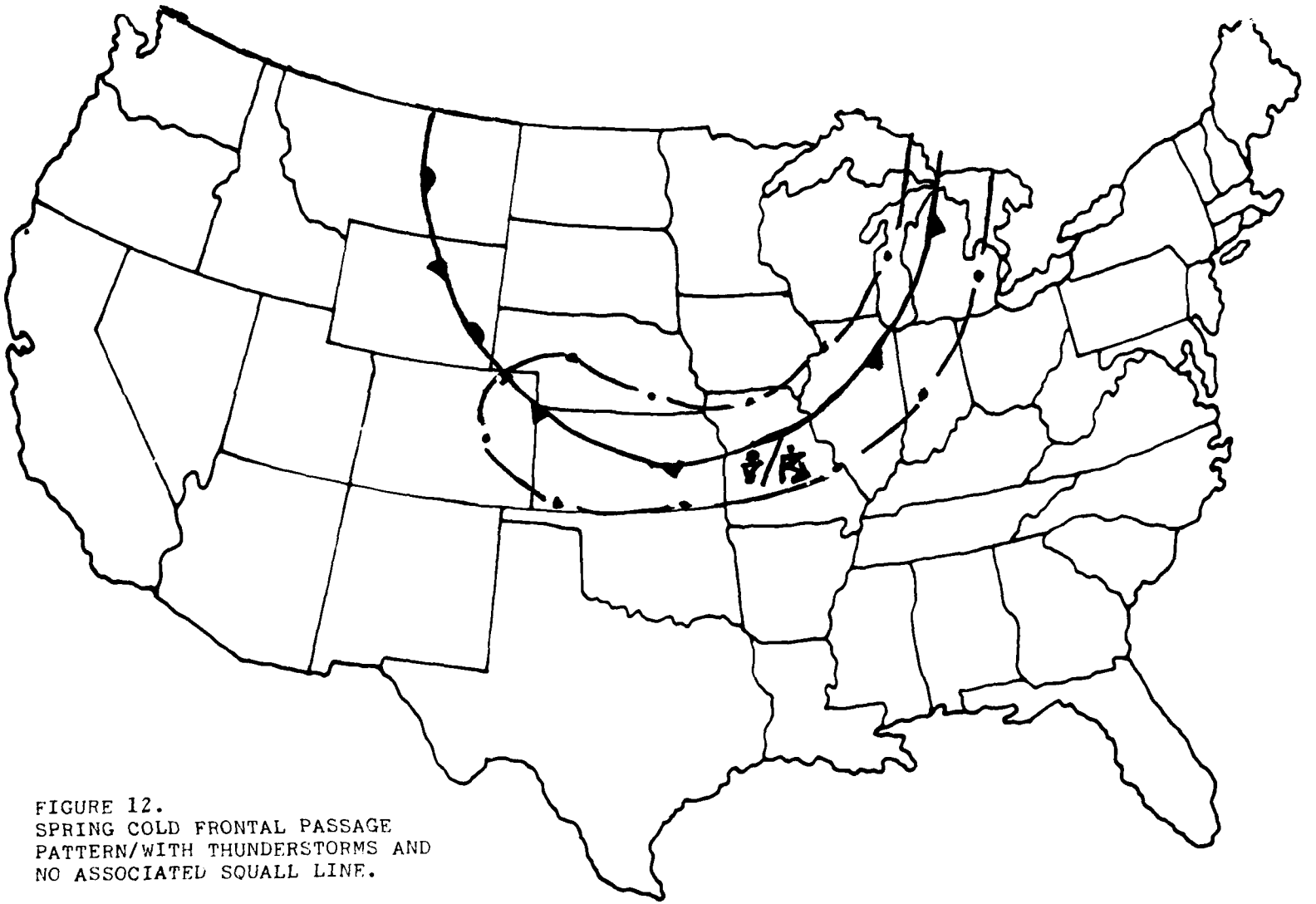


FIGURE 12.
SPRING COLD FRONTAL PASSAGE
PATTERN/WITH THUNDERSTORMS AND
NO ASSOCIATED SQUALL LINE.

Smoke and haze decrease during this transition period, occasionally restricting the visibilities to 3 miles during the day.

8) Flying conditions are hampered during this transition period by severe thunderstorms and radiation fog which are the main weather hazards. Occasionally, overruning situations will lower ceilings below 1500 feet but rarely below minimums. Icing conditions become less operationally significant as the freezing level rises to remain above 10,000 feet by May.

2-2. Seasonal Synoptic Features.

c. Summer (June, July, August)

1) Summer at Scott AFB is characterized by stifling daytime heat briefly interrupted by thunderstorms. Otherwise this period has relatively good flying weather regardless of flight levels.

2) The first month of this season is often typical of the preceding season in so far as a principal cyclone track lies over the north central Mississippi Valley, and severe thunderstorms are still a frequent threat to the base. However, after the latter part of June the more common summer pattern of little and infrequent change prevails. The Bermuda High becomes extended considerably further to the west, and is usually the most dominant influence on Scott weather. (See Figure 13). Local conditions are then characterized by high relative humidities and oppressive temperatures. Flying conditions are generally excellent under this regime featuring fair visibilities and scattered afternoon cumulus. Isolated to widely scattered airmass thunderstorms often develop within 50-100 miles of the base but seldom in the immediate vicinity. However, the forecaster must always watch for minor upper air features which may trigger thunderstorm activity.

3) During the greater part of the summer, principal cyclone tracks lie over Canada, far to the north of Scott AFB. Cyclones passing close to the base are rare, especially to the south. Weak cold frontal passages occur but the average is less than one per week. Although such frontal passages usually bring much relief from prolonged heat spells, they may present the forecaster with two problems: (1) prefrontal thunderstorm activity; (2) post-frontal overrunning. In the first case, the forecaster must evaluate the potential for severe thunderstorm development. While it is true that severe thunderstorms are less frequent during this season as compared to the spring, more than adequate moisture is usually available so the forecaster must be aware of the possible dynamic contributions. It should also be noted that when severe thunderstorms do develop during the summer, it is more likely that hail and high winds will result rather than tornadoes. This is particularly true under situations with northwesterly flow aloft.

a) Some of the severe weather in the Missouri-Illinois-Indiana area, particularly during the summer, occurs with thunderstorms with a northwest flow aloft. The squall lines normally develop in the northeast sector of a 500mb ridge and are usually associated with a short wave which has just moved over the top of the ridge and is beginning to move southeastward into the long wave trough to the east of our area. Since this is typically a summertime pattern, the flow aloft is sometimes relatively weak and the short wave is often difficult to find and follow at 500mb. It can often be located more easily at 200mb; furthermore, any suspicious area of 3 or 12 hourly surface pressure falls should be investigated for the possibility of a short wave. Cold air advection is usually evident at 500mb and possibly at 700mb with the short wave, while southerly flow and a moist tongue are characteristic features of the 850mb and surface charts.

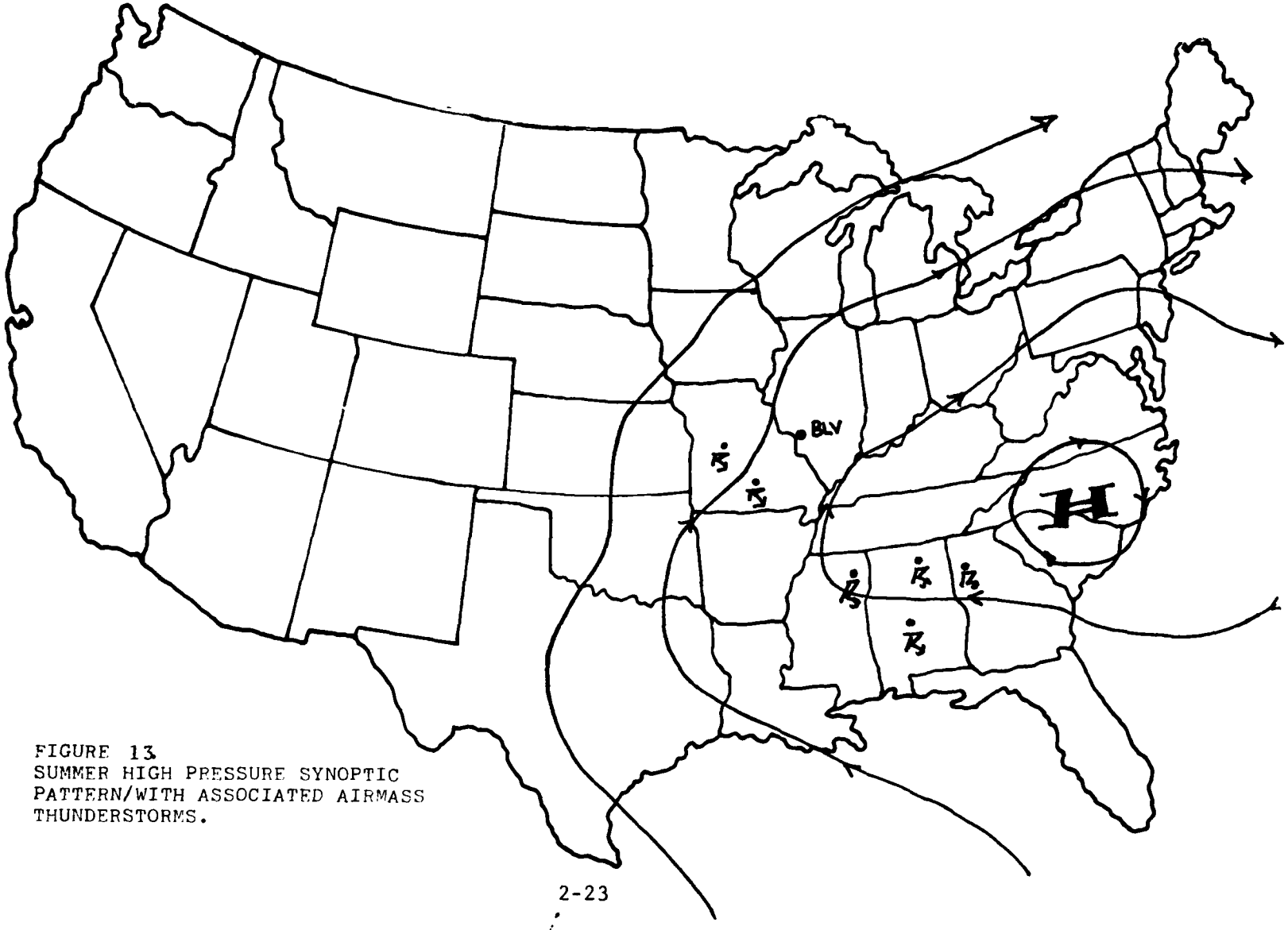


FIGURE 13
SUMMER HIGH PRESSURE SYNOPTIC PATTERN/WITH ASSOCIATED AIRMASS THUNDERSTORMS.

A weak NW-SE warm front is sometimes analyzed in the area. Squall lines often move southward much faster than would be expected from the mid-tropospheric winds, and are associated with windstorms and hail but rarely tornadoes. The squall line will continue southward so long as the airmass is favorable and the northerly flow aloft is maintained. (See Figure 14).

b) In the second case, the forecaster must consider the possibilities of the front becoming stationary to the south of the base over southern Missouri and southern Illinois. This situation develops a few times each season and can result in considerable rain and thunderstorm acitivity at the base with relatively low ceilings and visibilities.

4) One other situation which the forecaster must often consider during the summer is persistent early morning haze which causes visibility to briefly fall below five miles. Such a condition can prevail for a few consecutive mornings if an airmass becomes stagnant over the area. Once the condition has occurred and no major changes in airmass or circulation are anticipated, the forecaster can confidently forecast the restriction to recur the following morning.

5) Precipitation reaches its peak as do thunderstorms during the summer. June, with 9.33 days of precipitation and averaging 4.22 inches of rain, is the wettest month of the year; eight of these days are thunderstorm days. July also averages 8 thunderstorm days producing 3.69 inches of rain, while August has 7 thunderstorm days and 3.78 inches of rain. The maximum 24 hour amount was 9.22 inches in August 1946. August also holds the greatest monthly record of 21.05 inches of rain.

6) The average maximum temperature for the season is nearly 87°F while the average minimum is 66°F. Heat waves are common with the record high being 110°F which occurred in July. June has 19 hours with temperatures equal to or greater than 93°F while July has 35 hours and August has 28 hours.

7) Dense fog, sufficient to affect operations (visibilities less than 1/2 mile) reaches a minimum for the year in the summer and is not significant, with occurrences confined almost exclusively to the early morning hours. Smoke and haze occasionally reduce visibilities to 3-5 miles during the day.

8) Flying weather remains relatively good throughout the summer except for brief periods of thunderstorms. High temperatures above 100°F can occur several days during the summer and can cause density altitude problems for helicopters and takeoff roll problems for some fixed wing aircraft.

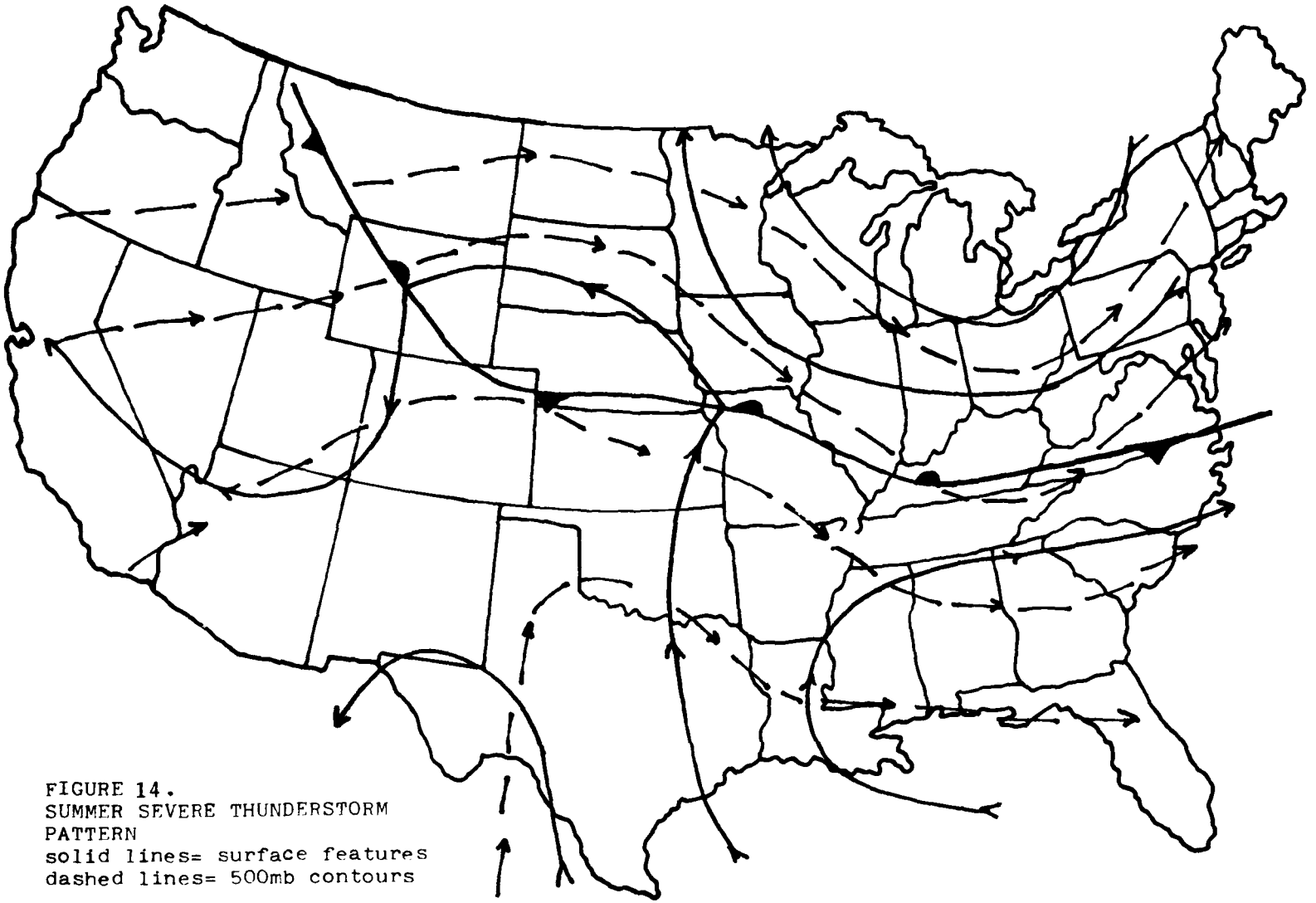


FIGURE 14.
SUMMER SEVERE THUNDERSTORM
PATTERN
solid lines= surface features
dashed lines= 500mb contours

2-2. Seasonal Synoptic Features.

d. Fall (September, October, November)

1) The autumn at Scott AFB is the best period of the year in terms of comfort and flying conditions.

2) As the early part of June is often typical of the spring season it follows, so is the early part of September similiar to summer. However, as fall continues, principal cyclone tracks are again found across the North central Mississippi Valley and airmass change becomes more and more frequent. Prefrontal thunderstorm activity is common but the development of severe thunderstorms occurs less often than in spring.

3) Although changes during this season are much more frequent than during the summer, some stagnation often occurs. One situation common to the area is the persistence of mP anticyclones which generally provide several days of clear skies and excellent visibilities.

4) The discussion of winter fog formation in the Kaskaskia River Basin is also valid for all three fall months.

5) Precipitation decreases slightly during this period from 3.12 inches in September to 2.53 inches in October and 3.02 inches in November. Thunderstorm days taper off from 4 days in September to 1 day in November. September and October can be very dry with the least amounts precipitation being 0.10 inches and 0.11 inches respectively. A trace of snow is the most recorded in October but November averages 1.6 inches. The greatest November 24 hour snow amount was 10.3 inches in 1975, while 12.7 inches is the greatest amount recorded for the entire month of November. Freezing precipitation has never been recorded in September and October but does occur in November.

6) Indian Summer is common in September which has 125 hours of temperatures 80°F or greater. The extreme maximum temperature in September is 103°F. Rapid transition then occurs between October and November with the average maximums falling from 70°F to near 54°F. Freezing temperatures have occurred in September while October averages 5.2 hours with 32°F or lower temperatures and November averages 118 hours.

7) Dense fog, sufficient to affect surface operation (visibilities less than 1/2 mile) increases in frequency from an average of .4% of hourly observations in September to .9% in November, but most of the occurrences are around sunrise and improve within two hours. Smoke and haze increases from summer to winter occasionally restricting visibility to 3 miles during the day.

8) Autumn has the best weather of the year and therefore the best flying conditions for Scott AFB. The frequency of fog increases and the frequency of thunderstorms decreases.

CHAPTER 3

CLIMATIC AIDS AND FORECASTING TECHNIQUES

3-1. Severe Thunderstorm Case Study at Scott AFB (7 May 1961)

a. Introduction

1) One of the most severe thunderstorms ever reported at Scott AFB occurred on 7 May 1961. A discussion of the synoptic situation preceding and accompanying this particular storm is presented, as well as a description of the ensuing weather at the base.

b. Synoptic Situation

1) Surface - At 1200Z, 7 May 1961, the surface chart showed a low pressure center in west-central Kansas with a cold front extending (See Figure 15) southward across the Texas-Oklahoma Panhandles into southwestern Texas. A warm front extended from the low center eastward across Kansas, central Missouri and southern Illinois into Indiana. South of the warm front, a warm, moist and unstable airmass was present with dewpoints generally in the low and middle sixties (The lifted index for the airmass around Scott was -2). A weakening instability line was associated with some thunderstorm activity being reported across Indiana, extreme southern Illinois, and southeastern Missouri; the line had become inactive over northwestern Arkansas and northeastern Oklahoma. By 1500Z this instability line had carried thunderstorms into Kentucky and northwestern Arkansas (Figure 16). The low center had drifted southeastward into south-central Kansas and a new instability line has developed from southeastern Iowa across northwestern Missouri into eastern Kansas. The old instability line was active only over Kentucky at 1800Z but the new line had developed into a complex system over Missouri with additional thunderstorms having developed ahead of the earlier line (Figure 17). Meanwhile, the low center had taken a northeasterly course and was located over northeastern Kansas. By 2100Z (Figure 18) the low center had become a weak wave as the cold front to the south became stationary and the lowest pressure was observed over Texas. Strong squall line activity had spread into Illinois and continued over eastern Missouri. During the period from 1200Z to 2100Z, the warm front had moved northward from its initial position in central Missouri and southern Illinois as strong southerly flow predominated at the surface.

2) 850MB (Figure 19) - The underlying surface features were well supported at the 850MB level with the isotherm pattern being defined. A strong band of southwesterly winds (50-75 kts) was associated with a significant moist tongue (dewpoints 53-59°F) which lay over northwestern Texas, eastern Oklahoma, western Arkansas, most of Missouri, southern Illinois and into Indiana. A warm tongue lay to the west of the maximum moisture band in a favorable position for squall line development.

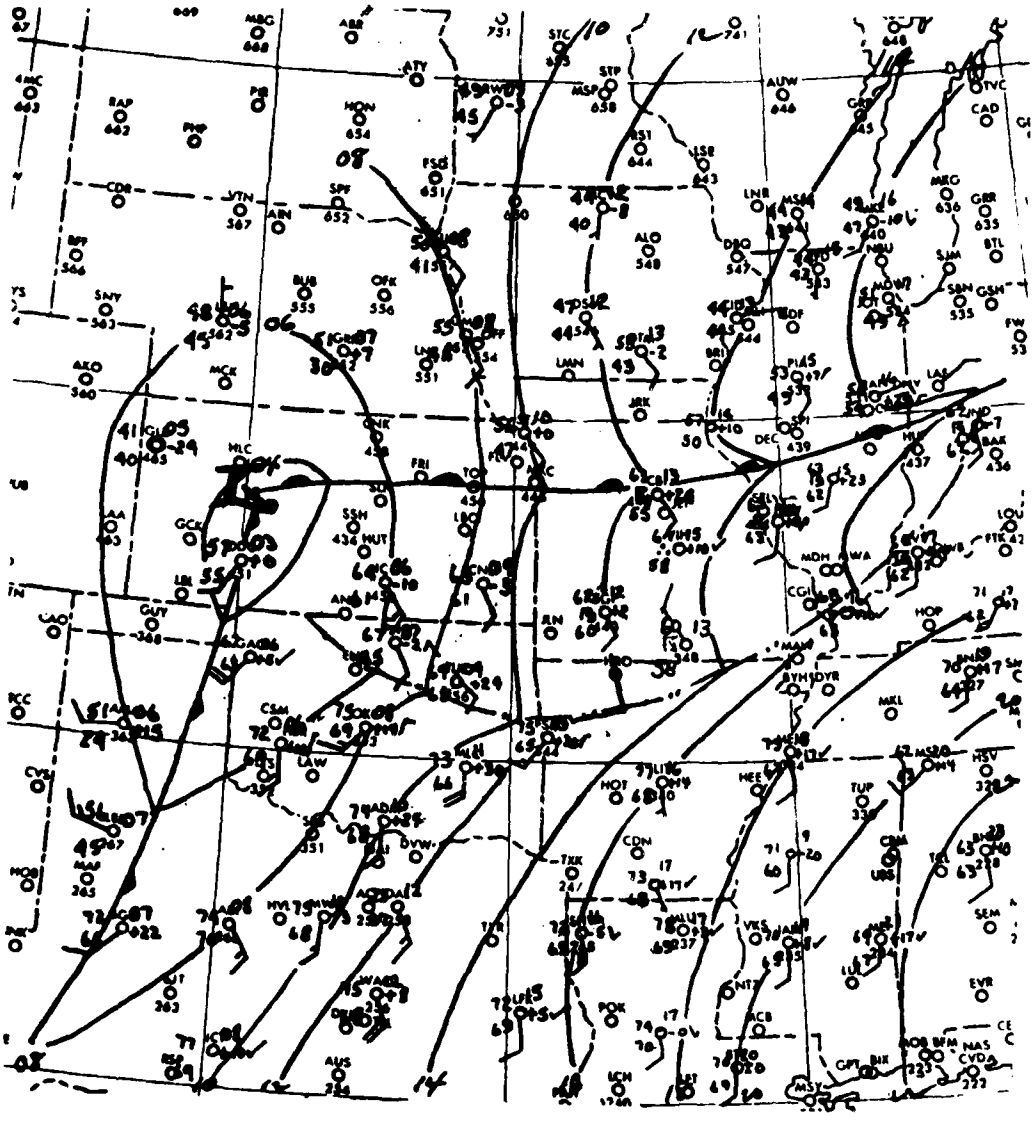


FIGURE 15.
SURFACE CHART
12Z (06C) 7 May 61

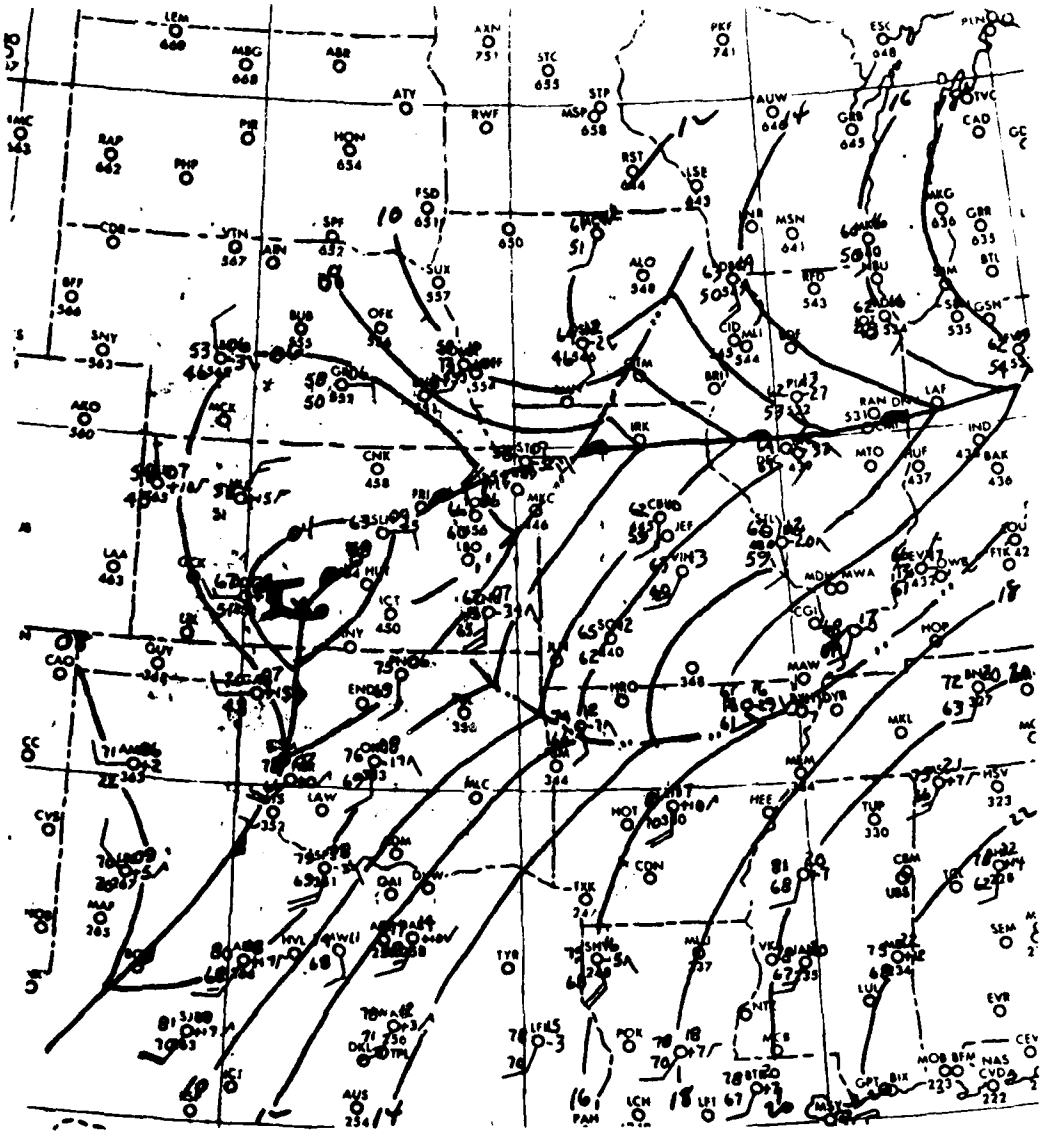


FIGURE 16.
SURFACE CHART
15Z (09C) 7 May 61

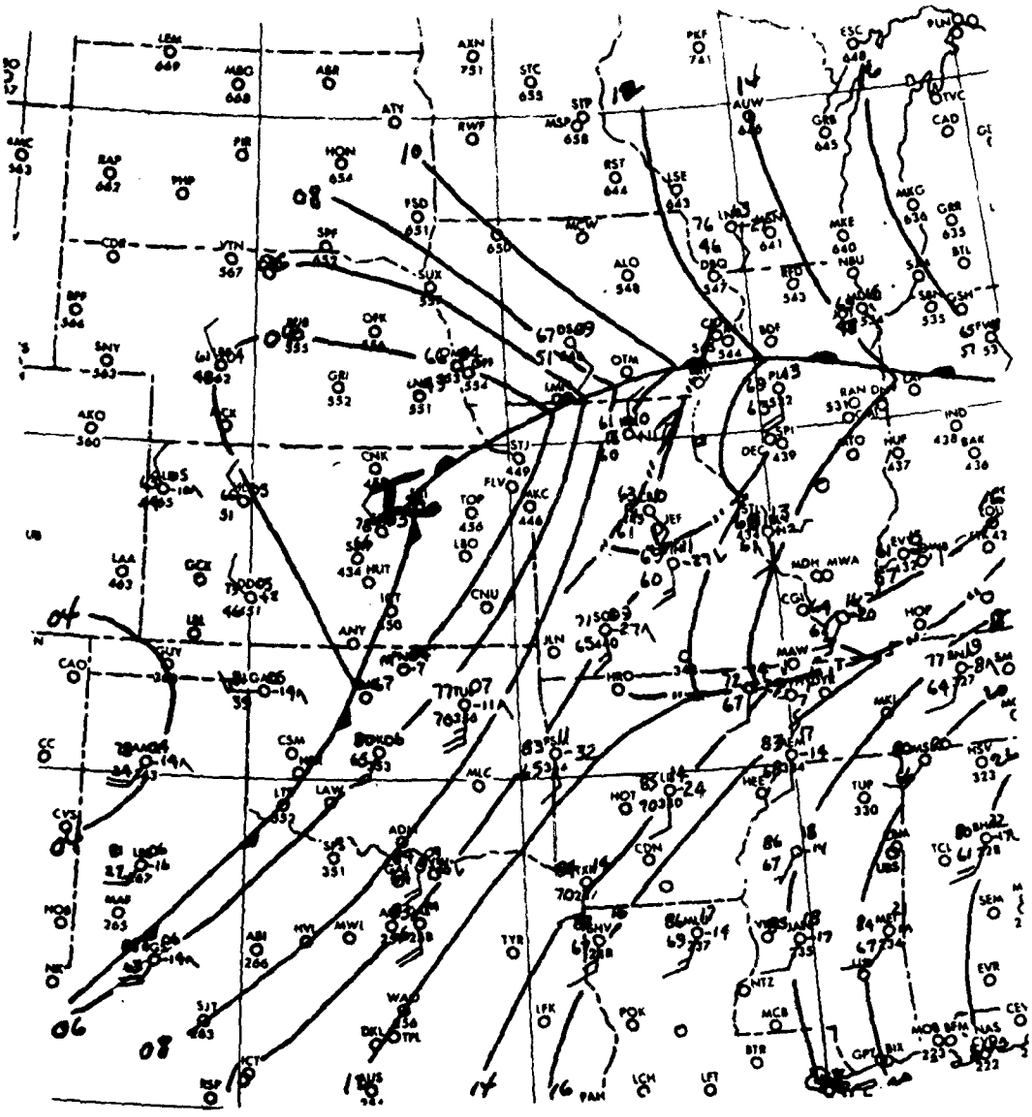


FIGURE 17.
SURFACE CHART
18Z (12C) 7 May 61

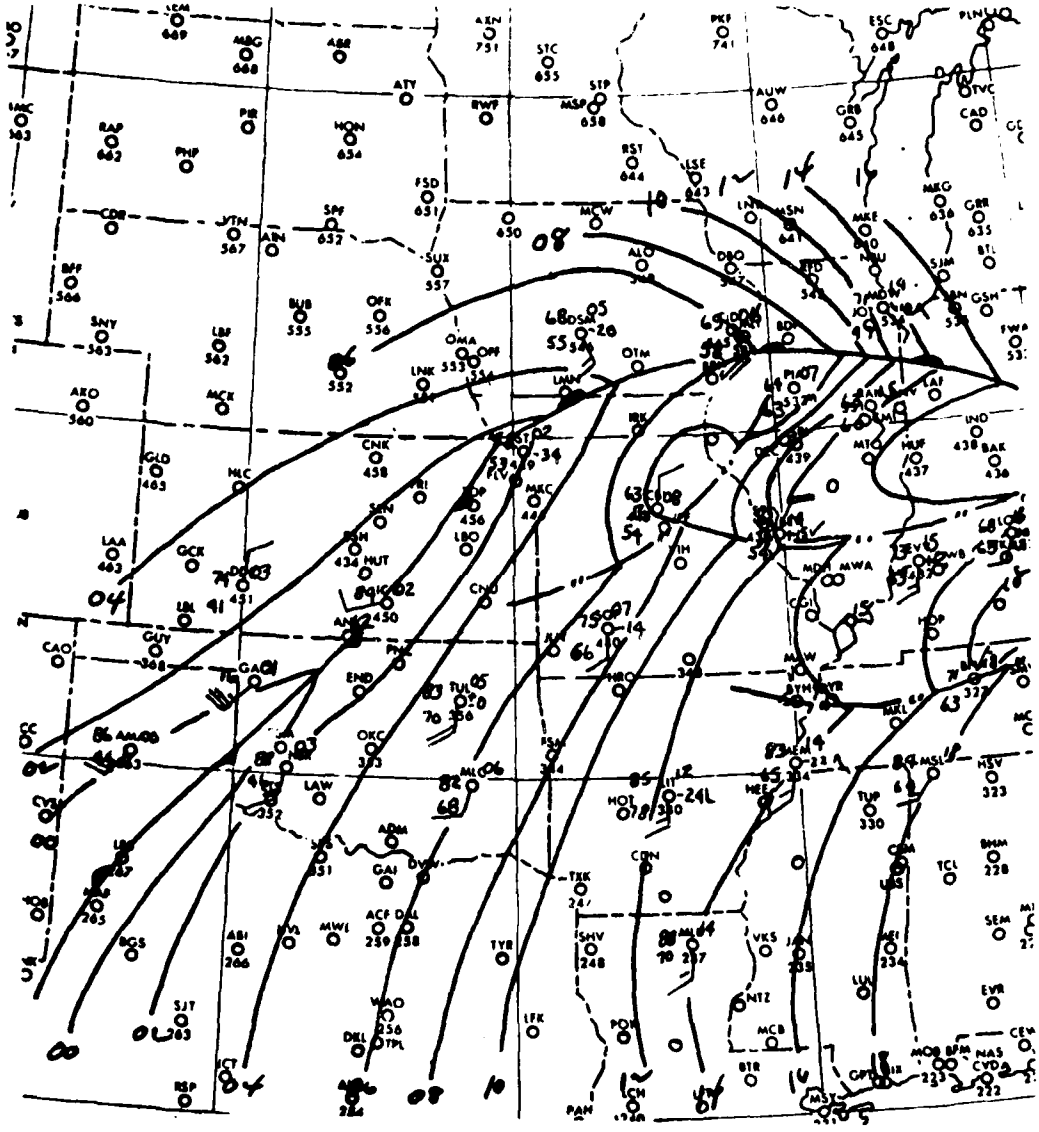


FIGURE 18.
SURFACE CHART
21Z (15C) 7 May 61

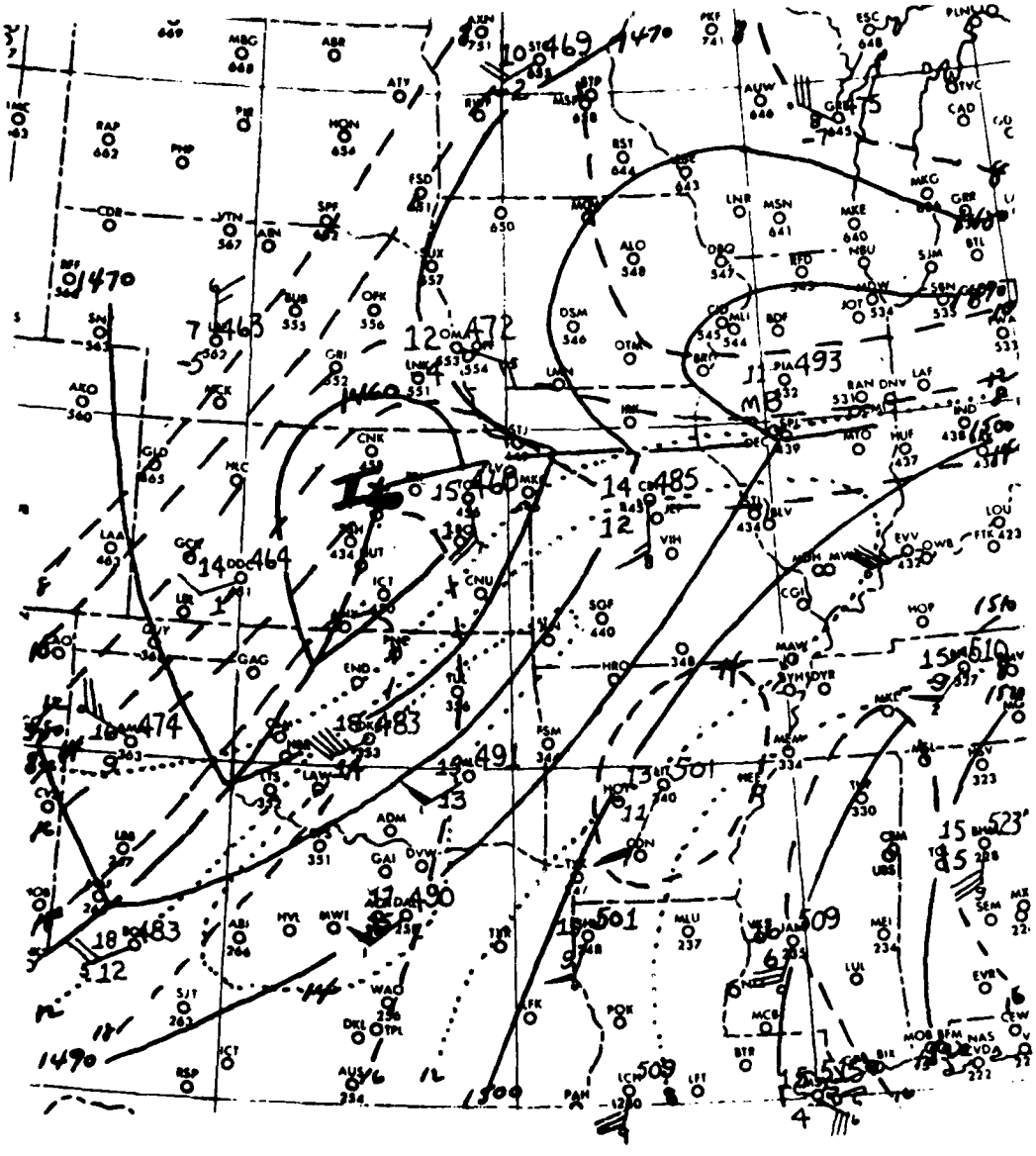


FIGURE 19.
850 MB
12Z (06C) 7 May 61

Solid lines - Contours (meters)
Dashed lines - Isotherms (deg C)
Dotted lines - Isodrosotherms (deg C)

3) 700MB (Figure 20) - The most significant feature at this level was the wind maximum (50-75 kts) located over eastern Oklahoma and Arkansas. A minor trough appeared to be located over the Missouri Valley but only warm advection was evident over the central US.

4) 500MB (Figure 21) - A minor short wave was evident from Lake Michigan southwestward across Illinois into southeastern Missouri. The most significant portion of this short wave was far to the north of Scott but nevertheless the southern portion was probably the upper mechanism associated with the weakening instability line at the surface described earlier. Neutral temperature advection was occurring over the area to be affected by the severe thunderstorms. The maximum wind band (50-75 kts) lay across the Texas-Oklahoma Panhandles, Kansas, and Missouri, directly over the surface low center and warm front.

c. Weather Events at Scott AFB.

1) Thunderstorms at the leading edge of the first squall line to move into the Scott AFB area arrived between 18Z and 19Z. At 2045Z hail, ranging in size from 1/2 to 1 inch diameter, was reported by the public within one mile northeast of the base. An intense thunderstorm passed directly over the base at approximately 20Z bringing heavy rain and 1/4 inch hail which fell for ten minutes, completely covering the ground. A bolt of lightning struck the wind equipment as the storm arrived and the instrument was rendered useless. The maximum wind gust was estimated to be greater than sixty knots.

2) Although the most severe weather was reported at Scott AFB with the first squall line to reach the base, several additional periods of heavy rain and hail were observed during the remainder of the day as squall lines continued to develop to the west of the base and move through the area. Three other occurrences of hail were reported, the longest of which lasted for fifteen minutes. Total rainfall for the day was 3.47 inches. The most severe phenomena reported in the general Scott AFB area during the day was a tornado which touched down at Red Bud, Illinois, about sixteen miles south of the base. This occurred at 0230Z and at 0239Z a cell with a long appendage was observed by the weather station CPS-9 radar set to be in the same general area as the reported tornado.

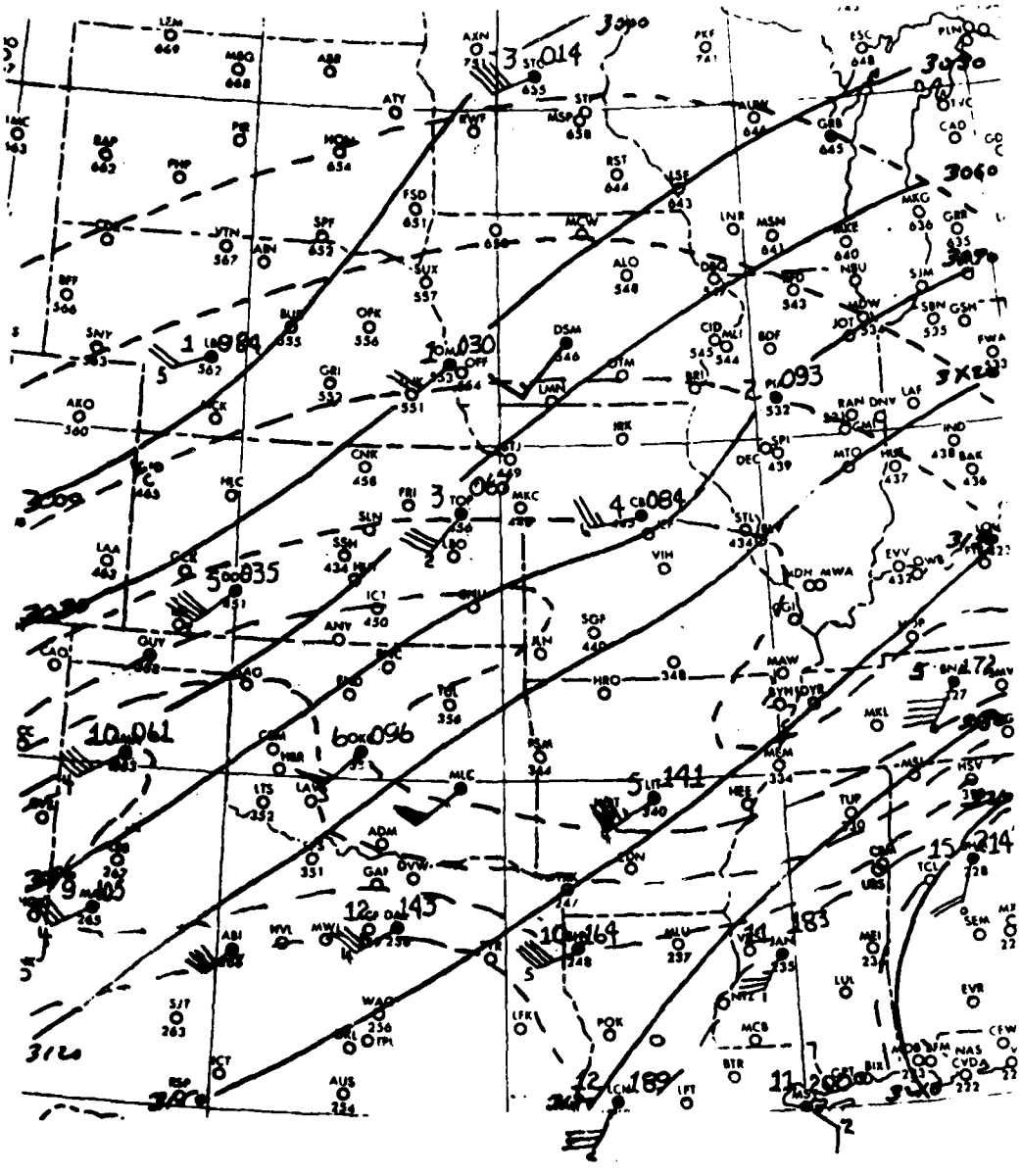


FIGURE 20.
500 MB
12Z (06C) 7 May 61
Solid lines - Contours (meters)
Dashed lines - Isotherms (deg C)

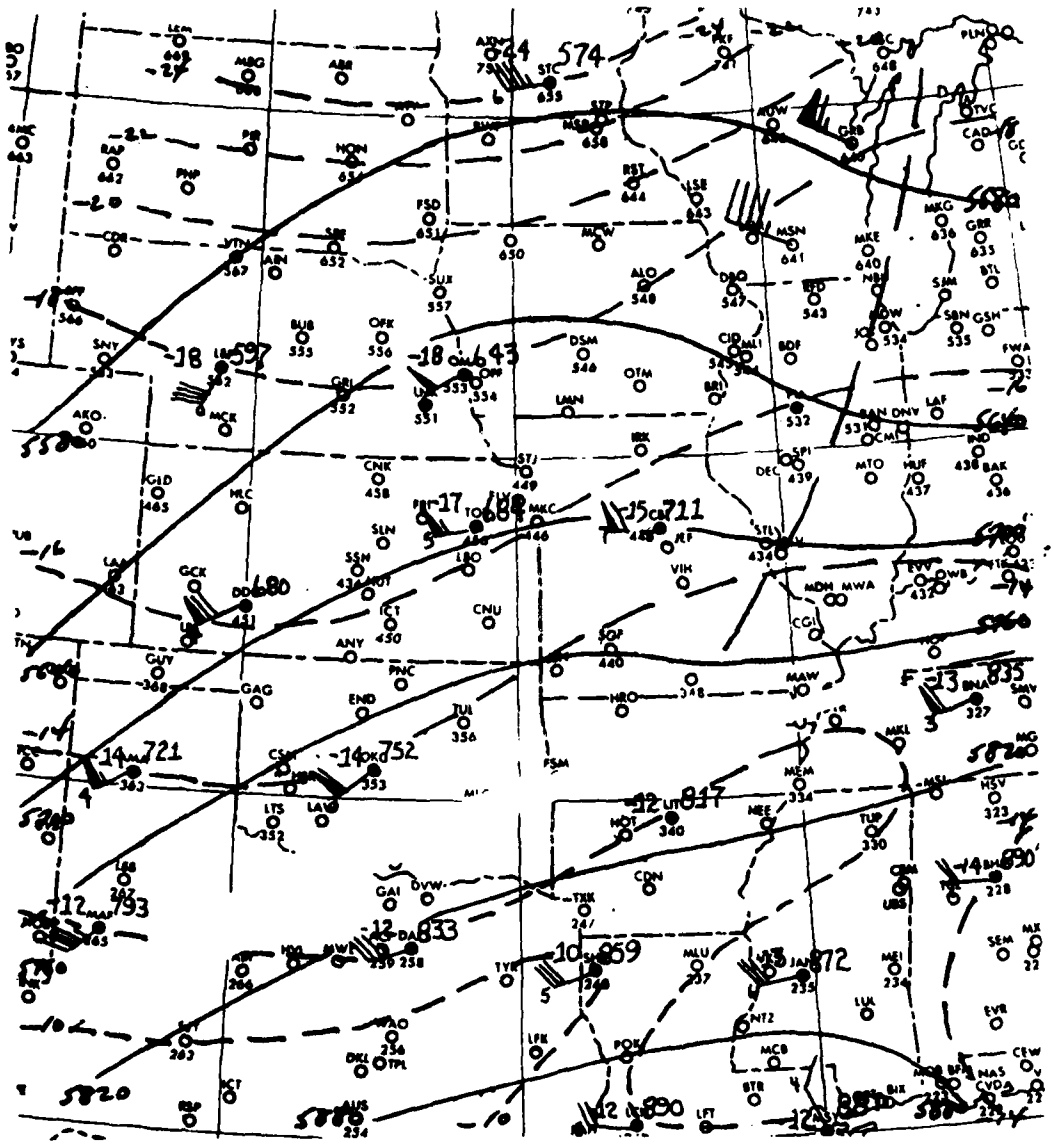


FIGURE 21.
700 MB
12Z (06C) 7 May 61

Solid lines - Contours (meters)
Dashed lines - Isotherms (deg C)

CLIMATOLOGICAL DATA
Scott AFB, Illinois
DATA FROM RUSSWO JAN 1938-DEC 1972

(DECEMBER)

Temperature:

Mean Daily	35.0°F
Mean daily maximum	42.8°F
Mean daily minimum	27.1°F
*Extreme maximum	75.0°F (1970)
*Extreme minimum	-8.0°F (1967)
Mean number of hours 32°F or lower	318.6 Hours
Mean number of hours 0°F or lower	1.8 Hours

Precipitation:

*Mean monthly amount	2.65 inches
*Greatest monthly amount	8.63 inches (1971)
*Minimum monthly amount	0.09 inches (1955)
*Greatest amount in 24 hours	3.22 inches (1971)
Mean number of days with measurable amount	8.49 days

Snowfall:

*Mean total snowfall	2.8 inches
*Maximum monthly snowfall	22.5 inches (1973)
*Maximum snowfall in 24 hours	13.6 inches (1973)
Mean number of days with measurable snowfall	2.23 days
Mean number of days with greater than 1 inch snowfall	1.36 days

Surface Winds:

Mean Hourly speed	7.7 Kts
*Maximum recorded speed (gusts)	51.0 Kts WSW (1948)
Frequency of windspeed greater than 27 Kts	.1%
Prevailing direction S (Primary)	NW (Secondary)

Weather Conditions - Frequency of Occurrence from Hourly Observations:

Rain and/or drizzle	8.2%
Freezing rain and/or drizzle	0.8%
Snow or sleet	4.5%
Mean number of days thunderstorms	Less than 1 day

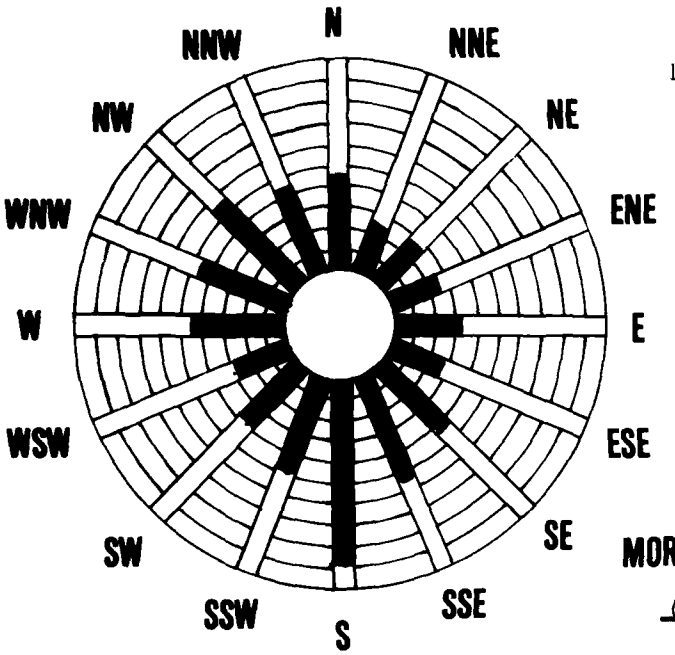
Percent Frequency of Occurrence-Ceiling + Visibility:

Less than 200' x 1/2 mile	1.9%
Equal or greater than 200' x 1/2 mile but less than 500' x 1 mile	3.9%
Equal or greater than 500' x 1 mile but less than 1500' x 3 miles	16.2%
Equal or greater than 1500'x 3 miles but less than 5000' x 5 miles	25.2%
Equal or greater than 5000' x 5 miles	52.8%

*Indicates data through Nov 79

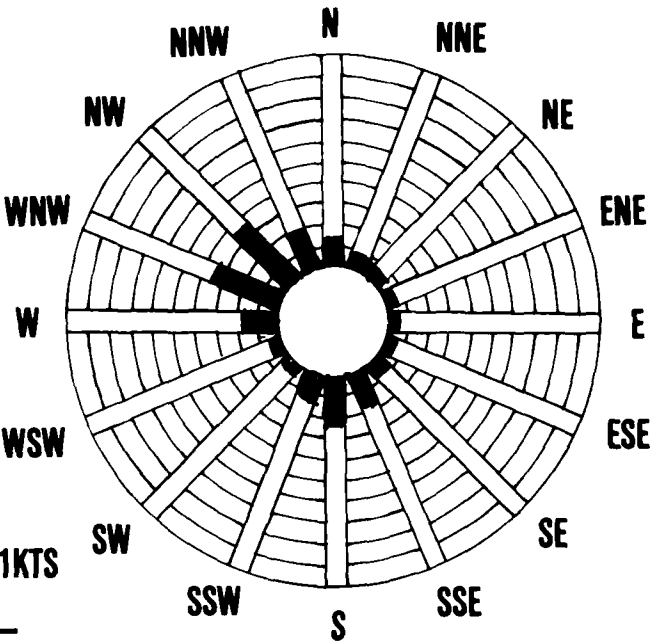
CALM (9.1 %)

LESS THAN 11KTS (66.7 %)



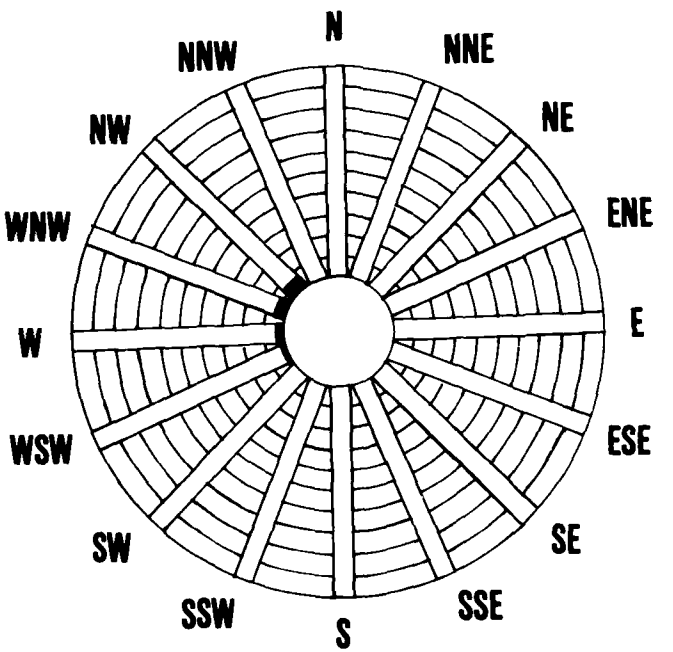
DECEMBER

11KTS TO 21KTS (23.1 %)



MORE THAN 21KTS

(1.1%)



SCALE

CLIMATOLOGICAL DATA
Scott AFB, Illinois (JANUARY)
DATA FROM RUSSWO JAN 1938-DEC 1972

Temperature:

Mean Daily	30.7°F
Mean daily maximum	38.9°F
Mean daily minimum	22.3°F
*Extreme maximum	75.0°F (1950)
*Extreme minimum	-19.0°F (1977)
Mean number of hours 32°F or lower	409.8 Hours
Mean number of hours 0°F or lower	12 Hours

Precipitation:

*Mean monthly amount	2.07 inches
*Greatest monthly amount	8.88 inches (1950)
*Minimum monthly amount	0.23 inches
*Greatest amount in 24 hours	3.58 inches (1950)
Mean number of days with measurable amount	7.84 days

Snowfall:

*Mean total snowfall	5.0 inches
*Maximum monthly snowfall	23.2 inches (1979)
*Maximum snowfall in 24 hours	7.0 inches (1962)
Mean number of days with measurable snowfall	3.07 days
Mean number of days with greater than 1 inch snowfall	2.39 days

Surface Winds:

Mean Hourly speed	8.1 Kts
*Maximum recorded speed (gusts)	55.0 Kts WSW (1947)
Frequency of windspeed greater than 27 Kts	.4%
Prevailing direction S (Primary)	S (Secondary)

Weather Conditions - Frequency of Occurrence from Hourly Observations:

Rain and/or drizzle	6.2%
Freezing rain and/or drizzle	1.3%
Snow or sleet	6.1%
Mean number of days thunderstorms	Less than 1 day

Percent Frequency of Occurrence-Ceiling + Visibility:

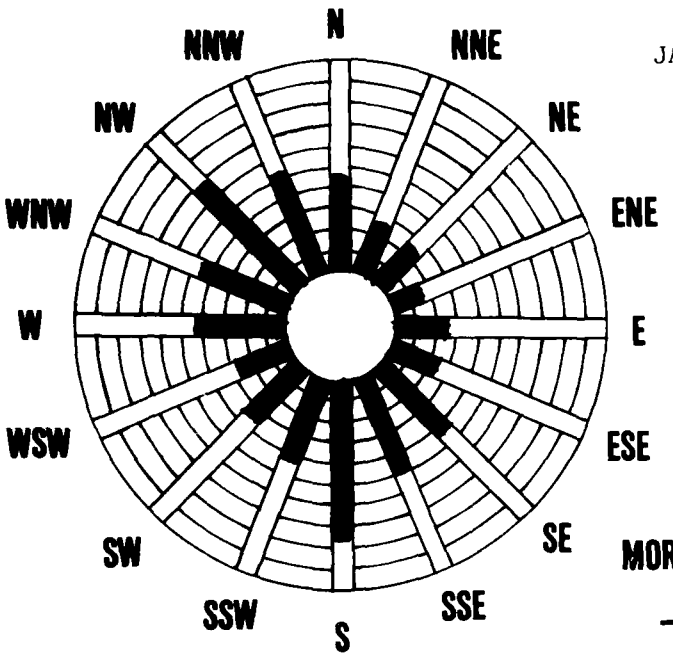
Less than 200' x 1/2 mile	2.4%
Equal or greater than 200' x 1/2 mile but less than 500' x 1 mile	5.4%
Equal or greater than 500' x 1 mile but less than 1500' x 3 miles	17.3%
Equal or greater than 1500'x 3 miles but less than 5000' x 5 miles	39.5%
Equal or greater than 5000' x 5 miles	52.7%

*Indicates data through Nov 79

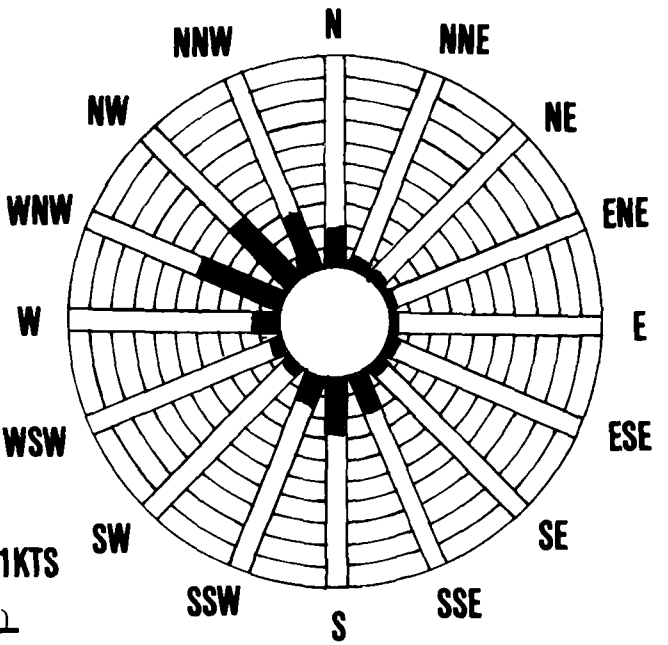
CALM (8.6 %)

LESS THAN 11KTS (64.6 %)

11KTS TO 21KTS (24.9 %)

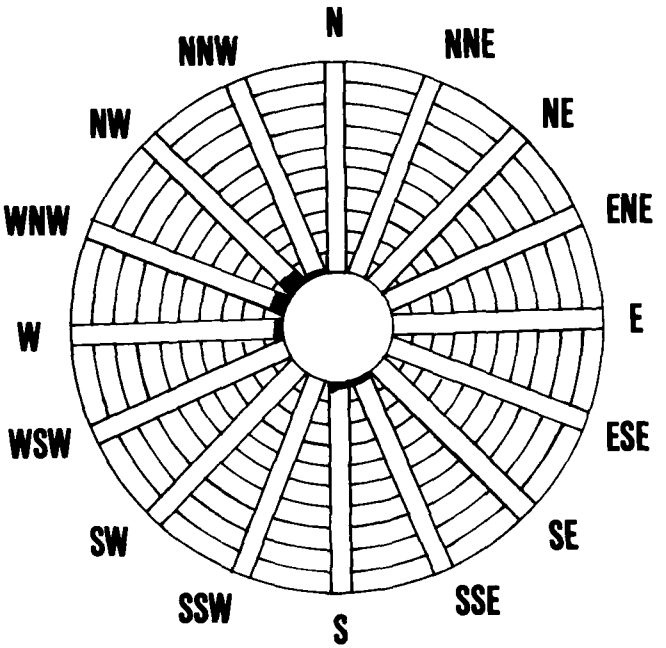


JANUARY



MORE THAN 21KTS

(1.9 %)



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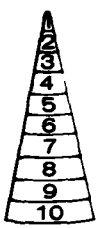


CLIMATOLOGICAL DATA
Scott AFB, Illinois (FEBRUARY)
DATA FROM RUSSWO JAN 1938-DEC 1972

Temperature:	
Mean Daily	35.2°F
Mean daily maximum	43.7°F
Mean daily minimum	26.3°F
*Extreme maximum	81.0°F (1962/72)
*Extreme minimum	-11.0°F (1951)
Mean number of hours 32°F or lower	289.6 Hours
Mean number of hours 0°F or lower	1.3 Hours
Precipitation:	
*Mean monthly amount	2.31 inches
*Greatest monthly amount	6.19 inches (1951)
*Minimum monthly amount	.31 inches (1958)
*Greatest amount in 24 hours	2.78 inches (1975)
Mean number of days with measurable amount	7.4 days
Snowfall:	
*Mean total snowfall	3.4 inches
*Maximum monthly snowfall	13.9 inches (1966)
*Maximum snowfall in 24 hours	12.1 inches (1966)
Mean number of days with measurable snowfall	2.1 days
Mean number of days with greater than 1 inch snowfall	1.46 days
Surface Winds:	
Mean Hourly speed	8.4 Kts
*Maximum recorded speed (gusts)	68 Kts WNW (1956)
Frequency of windspeed greater than 27 Kts	.5%
Prevailing direction S (Primary)	S (secondary)
Weather Conditions - Frequency of Occurrence from Hourly Observations:	
Rain and/or drizzle	7.6%
Freezing rain and/or drizzle	.6%
Snow or sleet	5.7%
Mean number of days thunderstorms	Less than 1 day
Percent Frequency of Occurrence-Ceiling + Visibility:	
Less than 200' x 1/2 mile	1.2%
Equal or greater than 200' x 1/2 mile but less than 500' x 1 mile	4.0%
Equal or greater than 500' x 1 mile but less than 1500' x 3 miles	14.7%
Equal or greater than 1500' x 3 miles but less than 5000 x 5 miles	23.7%
Equal or greater than 5000' x 5 miles	56.4%

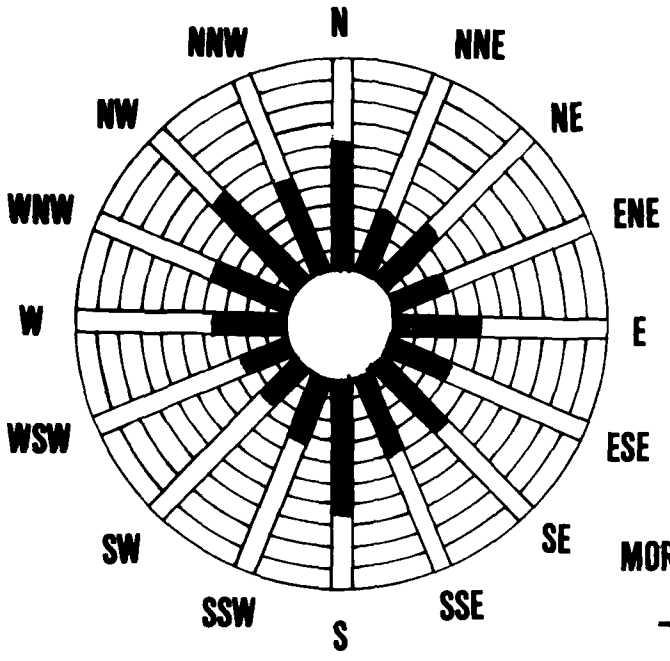
*Indicates data through Nov 79

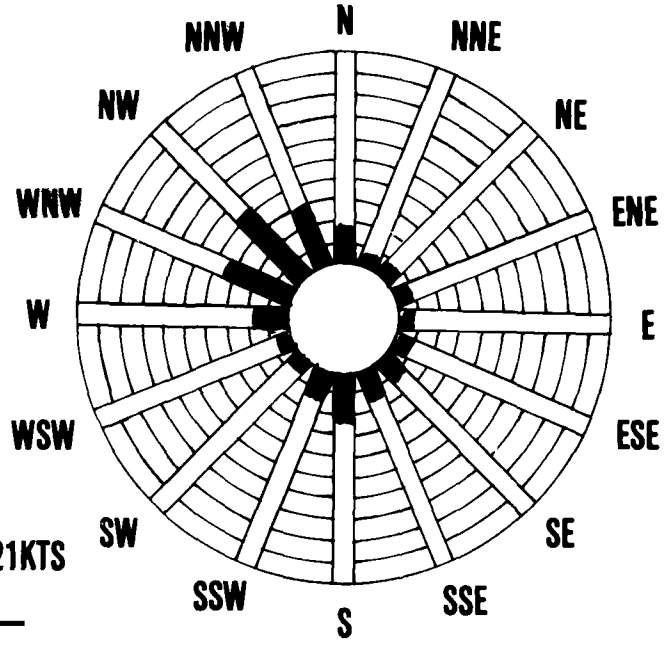
CALM (7.6 %)

LESS THAN 11KTS (63.8 %)

11KTS TO 21KTS (26.2 %)

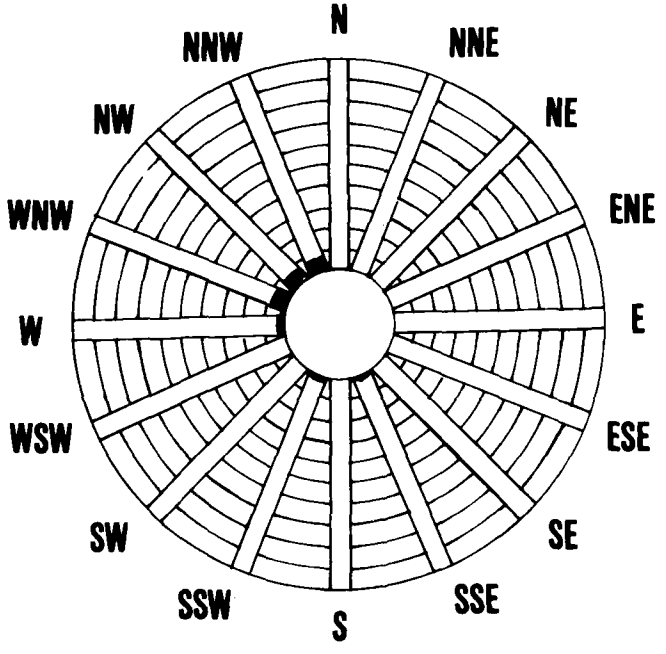
FEBRUARY





MORE THAN 21KTS

(2.4 %)



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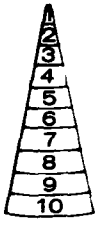


CLIMATOLOGICAL DATA
Scott AFB, Illinois (MARCH)
DATA FROM RUSSWO JAN 1938-DEC 1972

Temperature:	
Mean Daily	43.6°F
Mean daily maximum	53.1°F
Mean daily minimum	33.9°F
*Extreme maximum	85.0°F (1940)
*Extreme minimum	-3.0°F (1960)
Mean number of hours 32°F or lower	151.4 Hours
Mean number of hours 0°F or lower	.1 Hours
Precipitation:	
*Mean monthly amount	3.54 inches
*Greatest monthly amount	9.96 inches (1945)
*Minimum monthly amount	.55 inches (1941)
*Greatest amount in 24 hours	2.48 inches (1945)
Mean number of days with measurable amount	9.98
Snowfall:	
*Mean total snowfall	3.8 inches
*Maximum monthly snowfall	20.4 inches (1960)
*Maximum snowfall in 24 hours	7.3 inches (1968)
Mean number of days with measurable snowfall	2.39 days
Mean number of days with greater than 1 inch snowfall	1.74 days
Surface Winds:	
Mean Hourly speed	9.2 Kts
*Maximum recorded speed (gusts)	66.0 Kts SSW (1948)
Frequency of windspeed greater than 27 Kts	.4%
Prevailing direction S (Primary)	NW (secondary)
Weather Conditions - Frequency of Occurrence from Hourly Observations:	
Rain and/or drizzle	8.6%
Freezing rain and/or drizzle	.2%
Snow or sleet	4.1%
Mean number of days thunderstorms	3.1 days
Percent Frequency of Occurrence-Ceiling + Visibility:	
Less than 200' x 1/2 mile	0.9%
Equal or greater than 200' x 1/2 mile but less than 500' x 1 mile	2.1%
Equal or greater than 500' x 1 mile but less than 1500' x 3 miles	12%
Equal or greater than 1500'x 3 miles but less than 5000' x 5 miles	22.3%
Equal or greater than 5000' x 5 miles	62.7%

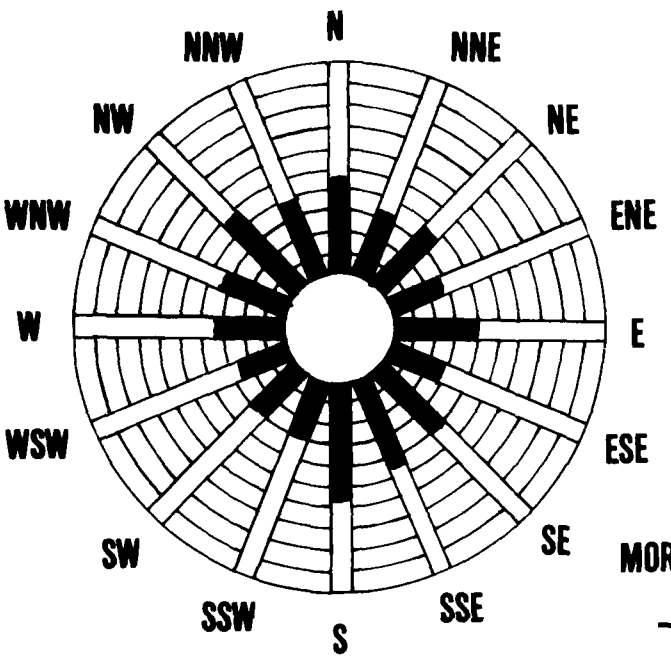
*Indicates data through Nov 79

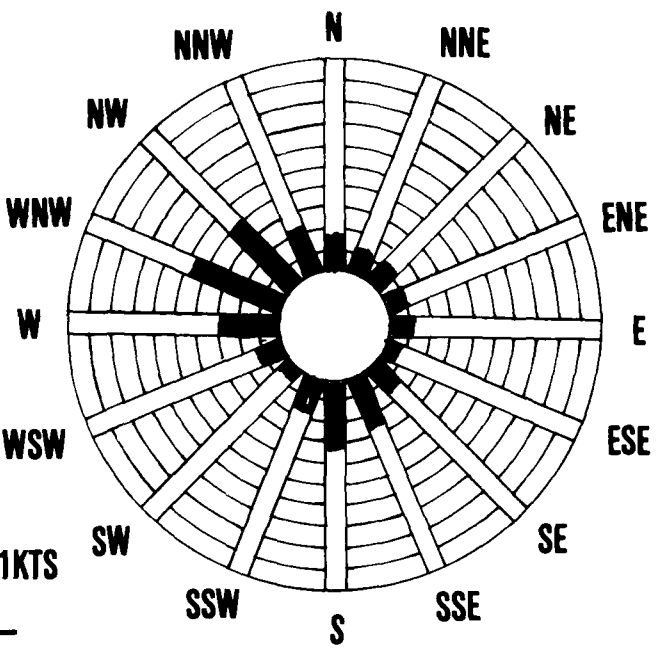
CALM (6.5 %)

LESS THAN 11KTS (59.0 %)

11KTS TO 21KTS (31.7 %)

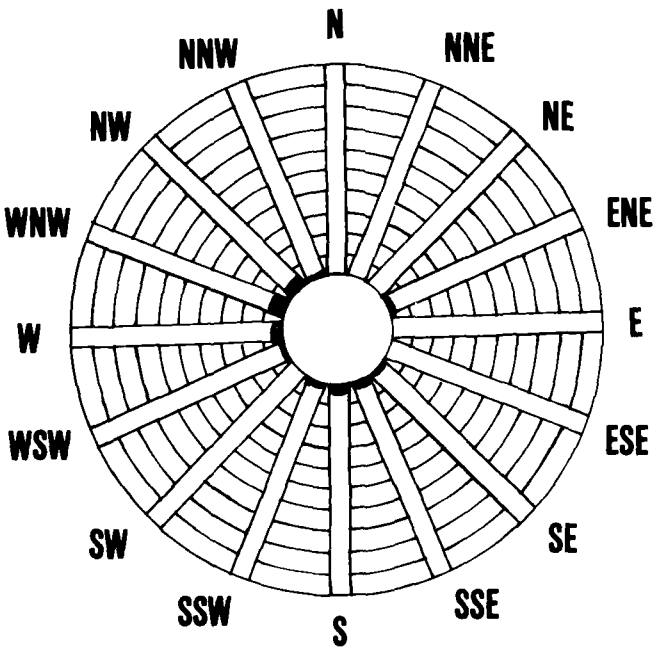
MARCH





MORE THAN 21KTS

(2.8 %)



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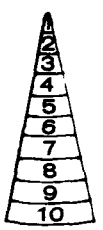


CLIMATOLOGICAL DATA
Scott AFB, Illinois (APRIL)
DATA FROM RUSSWO JAN 1938-DEC 1972

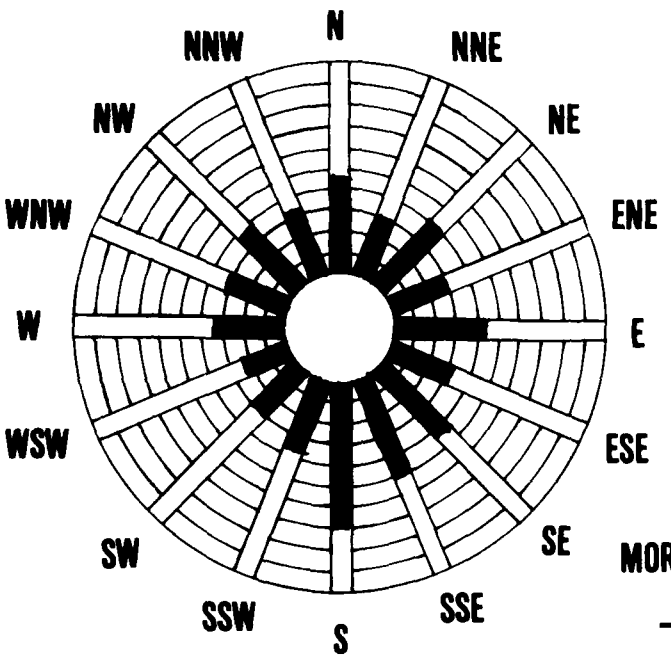
Temperature:	
Mean Daily	55.8°F
Mean daily maximum	65.8°F
Mean daily minimum	45.5°F
*Extreme maximum	90.0°F (1971)
*Extreme minimum	22.0°F (1954)
Mean number of hours 32°F or lower	8.7 Hours
Mean number of hours 0°F or lower	0.0 Hours
Precipitation:	
*Mean monthly amount	3.96 inches
*Greatest monthly amount	9.43 inches (1957)
*Minimum monthly amount	1.06 inches (1977)
*Greatest amount in 24 hours	2.94 inches (1952)
Mean number of days with measurable amount	10.56 days
Snowfall:	
*Mean total snowfall	.6 inches
*Maximum monthly snowfall	17.3 inches (1971)
*Maximum snowfall in 24 hours	9.5 inches (1971)
Mean number of days with measurable snowfall	0.18 days
Mean number of days with greater than 1 inch snowfall	0.12 days
Surface Winds:	
Mean Hourly speed	8.8 Kts
*Maximum recorded speed (gusts)	65.0 Kts E (1953)
Frequency of windspeed greater than 27 Kts	.2%
Prevailing direction S (Primary)	NW (secondary)
Weather Conditions - Frequency of Occurrence from Hourly Observations:	
Rain and/or drizzle	10.5%
Freezing rain and/or drizzle	.0%
Snow or sleet	0.5%
Mean number of days thunderstorms	6.2 days
Percent Frequency of Occurrence-Ceiling + Visibility:	
Less than 200' x 1/2 mile	4%
Equal or greater than 200' x 1/2 mile but less than 500' x 1 mile	1.2%
Equal or greater than 500' x 1 mile but less than 1500' x 3 miles	8.5%
Equal or greater than 1500'x 3 miles but less than 5000' x 5 miles	18.6%
Equal or greater than 5000' x 5 miles	71.3%

*Indicates data through Nov 79

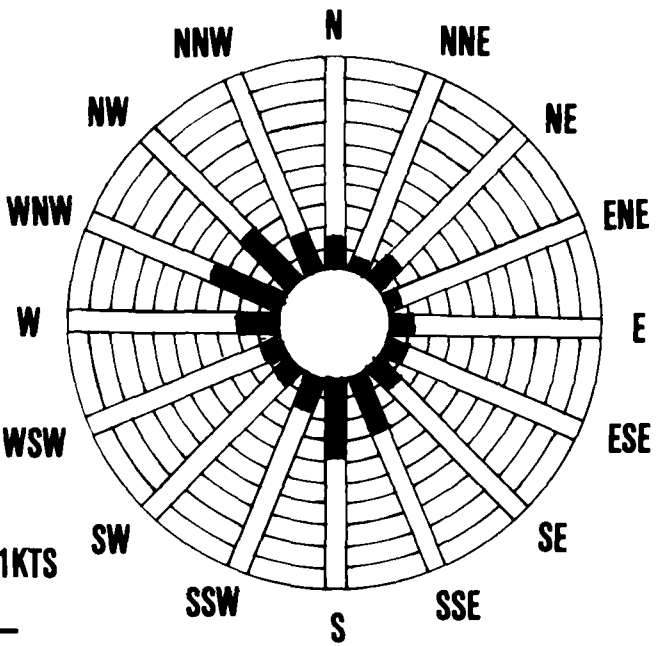
CALM (7.2 %)

LESS THAN 11KTS (61.3 %)

APRIL

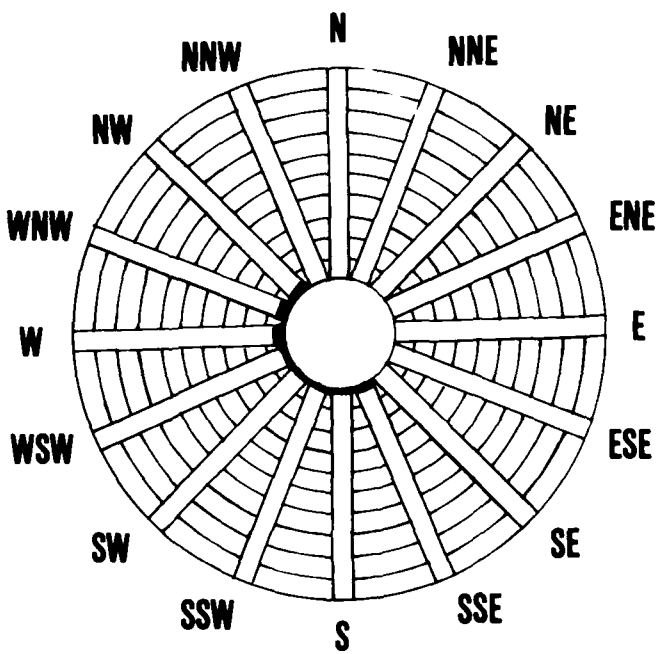


11KTS TO 21KTS (29.6 %)



MORE THAN 21KTS

(2.1 %)



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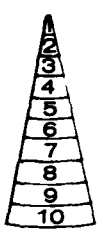


DATA FROM RUSSWO JAN 1938-DEC 1972 (MAY)

Temperature:

Mean Daily	65.2°F
Mean daily maximum	75.6°F
Mean daily minimum	54.7°F
*Extreme maximum	97.0°F (1953)
*Extreme minimum	29.0°F (1966)
Mean number of hours 32°F or lower	.1
Mean number of hours 0°F or lower	74.2 Hours

Precipitation:

*Mean monthly amount	3.91 inches
*Greatest monthly amount	9.86 inches (1961)
*Minimum monthly amount	1.43 inches (1972)
*Greatest amount in 24 hours	3.47 inches (1961)
Mean number od days with measurable amount	10.2 days

Snowfall:

*Mean total snowfall	None
*Maximum monthly snowfall	None
*Maximum snowfall in 24 hours	None
Mean number of days with measurable snowfall	None
Mean number of days with greater than 1 inch snowfall	None

Surface Winds:

Mean Hourly speed	6.8 Kts
*Maximum recorded speed (gusts)	75.0 Kts W (1952)
Frequency of windspeed greater than 27 Kts	.1%
Prevailing direction S (Primary)	SSE (secondary)

Weather Conditions - Frequency of Occurrence from Hourly Observations:

Rain and/or drizzle	7.9%
Freezing rain and/or drizzle	0.0%
Snow or sleet	0.0%
Mean number of days thunderstorms	6.7 days

Percent Frequency of Occurrence-Ceiling + Visibility:

Less than 200' x 1/2 mile	.3%
Equal or greater than 200' x 1/2 mile but less than 500' x 1 mile	1.1%
Equal or greater than 500' x 1 mile but less than 1500' x 3 miles	6.5%
Equal or greater than 1500' x 3 miles but less than 5000' x 5 miles	16%
Equal or greater than 5000' x 5 miles	76.3%

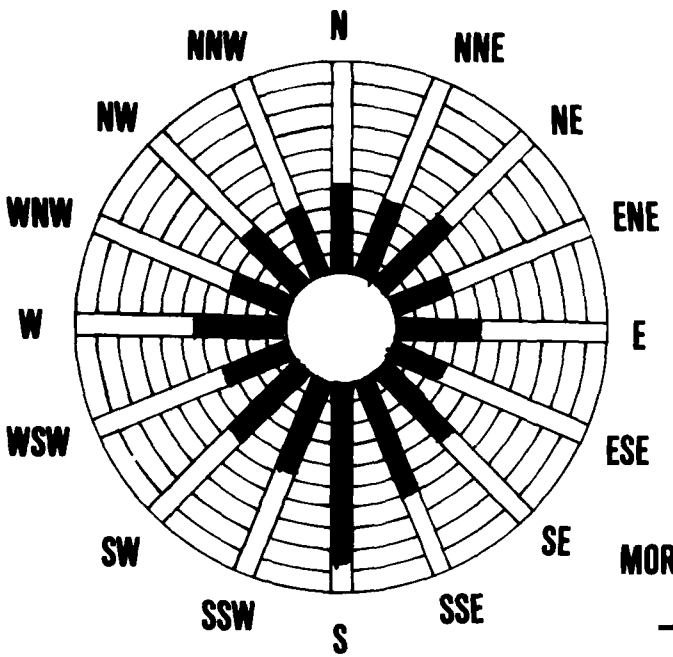
*Indicates data through Nov 79.

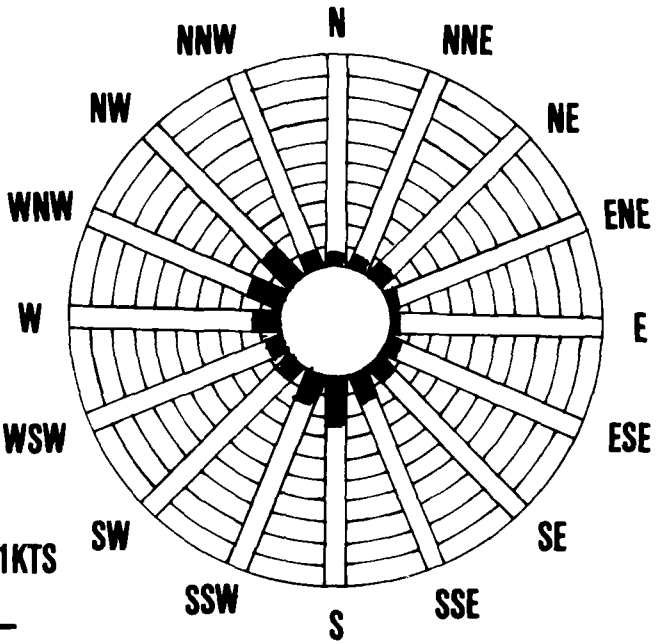
CALM (13.9 %)

LESS THAN 11KTS (67.6 %)

11KTS TO 21KTS (17.6 %)

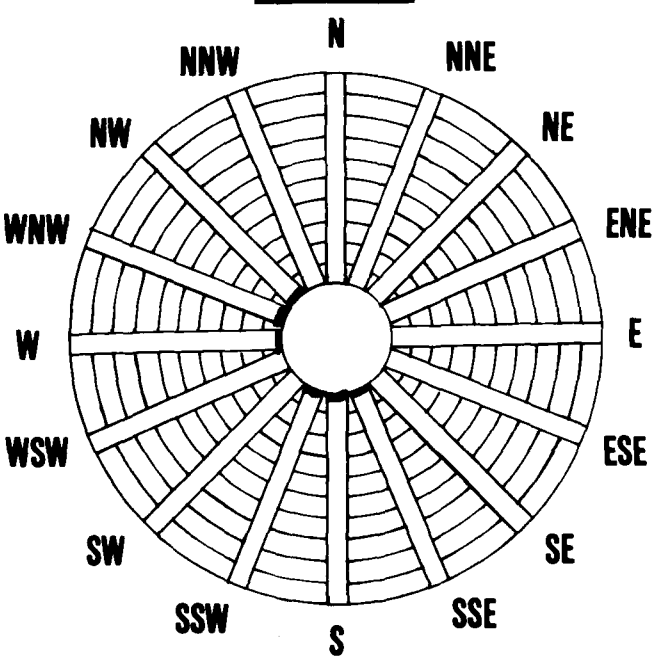
MAY





MORE THAN 21KTS

(.8 %)



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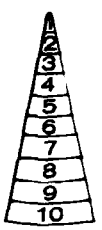


CLIMATOLOGICAL DATA
Scott AFB, Illinois (JUNE)
DATA FROM RUSSWO JAN 1938-DEC 1972

Temperature:

Mean Daily	74.7°F
Mean daily maximum	85.0°F
Mean daily minimum	64.1°F
*Extreme maximum	104.0°F (1952)
*Extreme minimum	44.0°F (1972)
Mean number of hours 32°F or lower	225.1 Hours
Mean number of hours 0°F or lower	19.2 Hours

Precipitation:

*Mean monthly amount	4.22 inches
*Greatest monthly amount	17.16 inches (1957)
*Minimum monthly amount	.88 inches (1959)
*Greatest amount in 24 hours	8.15 inches (1957)
Mean number of days with measurable amount	9.33 days

Snowfall:

*Mean total snowfall	None
*Maximum monthly snowfall	None
*Maximum snowfall in 24 hours	None
Mean number of days with measurable snowfall	None
Mean number of days with greater than 1 inch snowfall	None

Surface Winds:

Mean Hourly speed	6.0 Kts
*Maximum recorded speed (gusts)	62.0 Kts W (1948)
Frequency of windspeed greater than 27 Kts	.0%
Prevailing direction S (Primary)	SSW (secondary)

Weather Conditions - Frequency of Occurrence from Hourly Observations:

Rain and/or drizzle	5.4%
Freezing rain and/or drizzle	None
Snow or sleet	None
Mean number of days thunderstorms	7.4 days

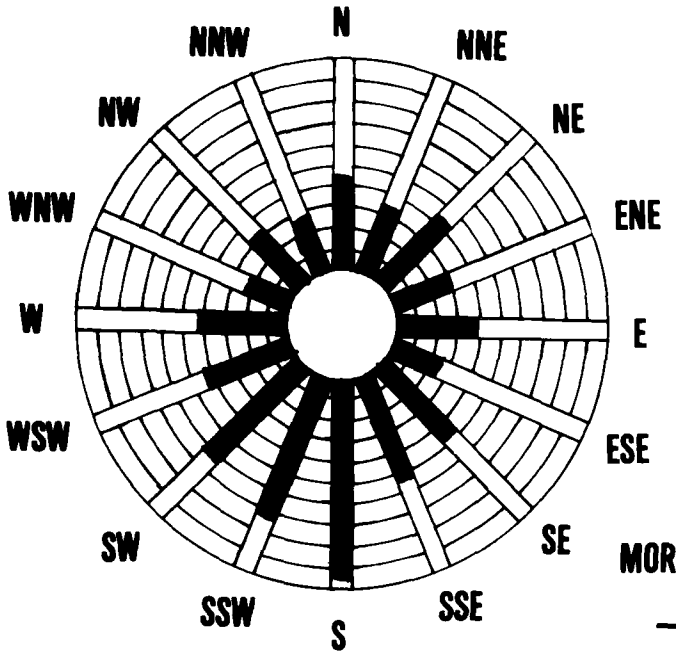
Percent Frequency of Occurrence-Ceiling + Visibility:

Less than 200' x 1/2 mile	.2%
Equal or greater than 200' x 1/2 mile but less than 500' x 1 mile	.4%
Equal or greater than 500' x 1 mile but less than 1500' x 3 miles	4.3%
Equal or greater than 1500'x 3 miles but less than 5000' x 5 miles	14.7%
Equal or greater than 5000' x 5 miles	80.4%

*Indicates data through Nov 79

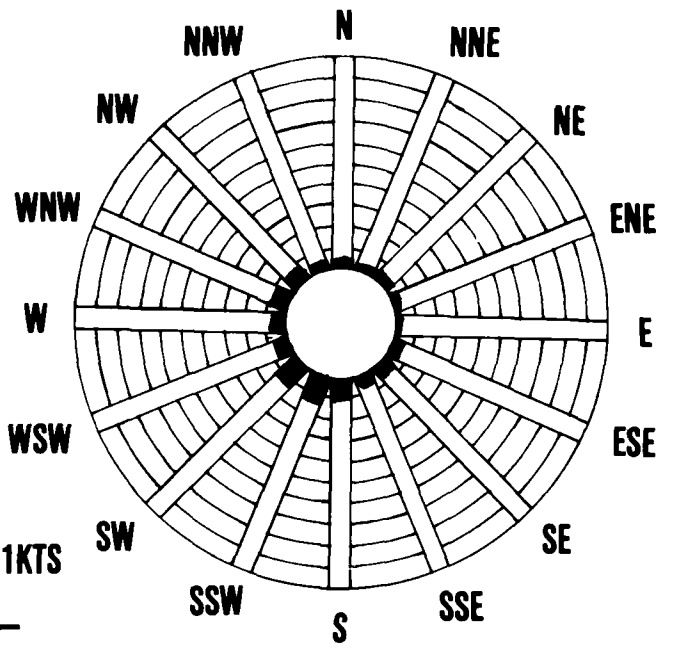
CALM (15.9 %)

LESS THAN 11KTS (71.7 %)



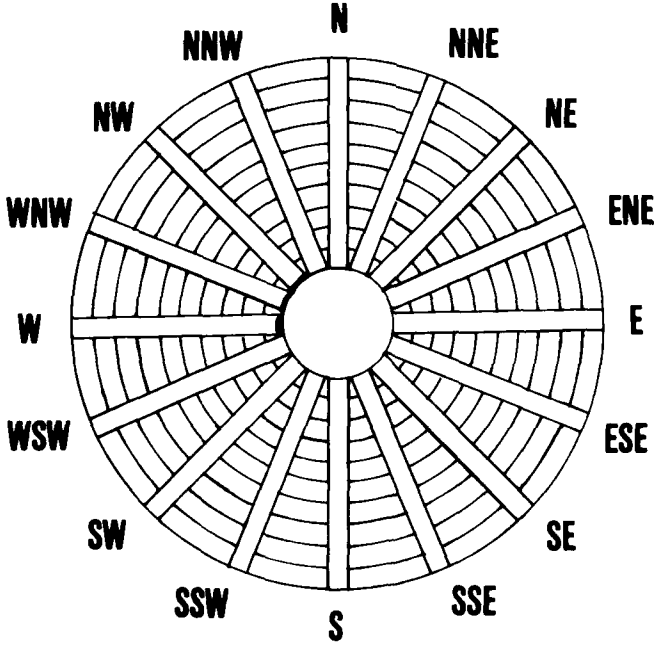
JUNE

11KTS TO 21KTS (12.1 %)



MORE THAN 21KTS

(0.3 %)



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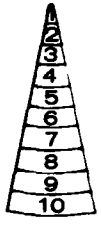
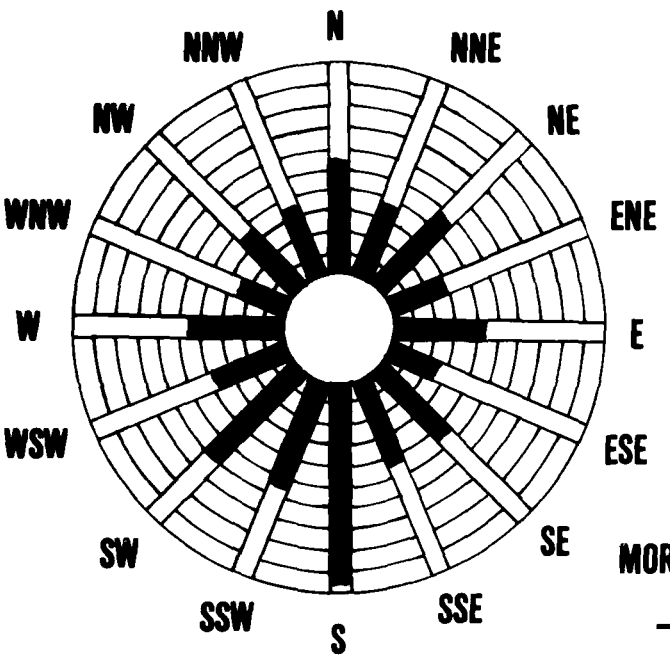


CLIMATOLOGICAL DATA
Scott AFB, Illinois (JULY)
DATA FROM RUSSWO JAN 1938-DEC 1972

Temperature:	
Mean Daily	78.0°F
Mean daily maximum	88.3°F
Mean daily minimum	67.4°F
*Extreme maximum	110.0°F (1954)
*Extreme minimum	48.0°F (1940)
Mean number of hours 32°F or lower	310.6 Hours
Mean number of hours 0°F or lower	34.9 Hours
Precipitation:	
*Mean monthly amount	3.69 inches
*Greatest monthly amount	11.56 inches (1948)
*Minimum monthly amount	.40 inches (1947)
*Greatest amount in 24 hours	5.49 inches (1942)
Mean number of days with measurable amount	8.2 days
Snowfall:	
*Mean total snowfall	None
*Maximum monthly snowfall	None
*Maximum snowfall in 24 hours	None
Mean number of days with measurable snowfall	None
Mean number of days with greater than 1 inch snowfall	None
Surface Winds:	
Mean Hourly speed	4.8 Kts
*Maximum recorded speed (gusts)	61.0 Kts NW (1957)
Frequency of windspeed greater than 27 Kts	0.0%
Prevailing direction S (Primary)	SW (secondary)
Weather Conditions - Frequency of Occurrence from Hourly Observations:	
Rain and/or drizzle	4.2%
Freezing rain and/or drizzle	None
Snow or sleet	None
Mean number of days thunderstorms	7.97 days
Percent Frequency of Occurrence-Ceiling + Visibility:	
Less than 200' x 1/2 mile	.2%
Equal or greater than 200' x 1/2 mile but less than 500' x 1 mile	.4%
Equal or greater than 500' x 1 mile but less than 1500' x 3 miles	3.1%
Equal or greater than 1500'x 3 miles but less than 5000' x 5 miles	11.8%
Equal or greater than 5000' x 5 miles	84.5%

*Indicates data through Nov 79

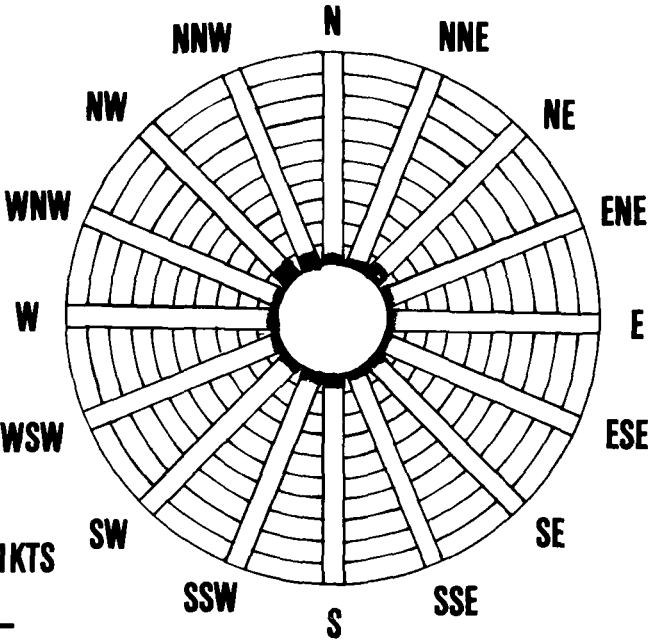
CALM (21.7 %)



LESS THAN 11KTS (71.6 %)

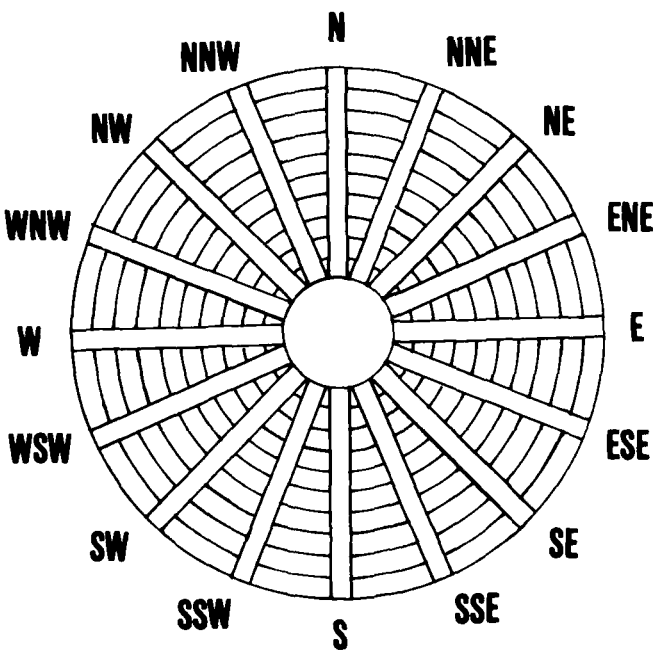
JULY

11KTS TO 21KTS (6.6 %)



MORE THAN 21KTS

(0.1 %)



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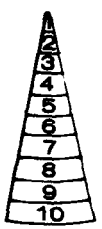


CLIMATOLOGICAL DATA
Scott AFB, Illinois (AUGUST)
DATA FROM RUSSWO JAN 1938-DEC 1972

Temperature:

Mean Daily	76.3°F
Mean daily maximum	86.9°F
Mean daily minimum	65.6°F
*Extreme maximum	104.0°F (1964)
*Extreme minimum	44.0°F
Mean number of hours 32°F or lower	261.3 Hours
Mean number of hours 0°F or lower	28.0 Hours

Precipitation:

*Mean monthly amount	3.78 inches
*Greatest monthly amount	21.05 inches (1946)
*Minimum monthly amount	0.07 inches (1969)
*Greatest amount in 24 hours	9.22 inches (1946)
Mean number of days with measurable amount	6.7 days

Snowfall:

*Mean total snowfall	None
*Maximum monthly snowfall	None
*Maximum snowfall in 24 hours	None
Mean number of days with measurable snowfall	None
Mean number of days with greater than 1 inch snowfall	None

Surface Winds:

Mean Hourly speed	4.7 Kts
*Maximum recorded speed (gusts)	52.0 Kts WSW (1962)
Frequency of windspeed greater than 27 Kts	0.0%
Prevailing direction S (Primary)	N (secondary)

Weather Conditions - Frequency of Occurrence from Hourly Observations:

Rain and/or drizzle	4.5%
Freezing rain and/or drizzle	None
Snow or sleet	None
Mean number of days thunderstorms	6.4 days

Percent Frequency of Occurrence-Ceiling + Visibility:

Less than 200' x 1/2 mile	.3%
Equal or greater than 200' x 1/2 mile but less than 500' x 1 mile	.7%
Equal or greater than 500' x 1 mile but less than 1500' x 3 miles	4.1%
Equal or greater than 1500'x 3 miles but less than 5000' x 5 miles	12.2%
Equal or greater than 5000' x 5 miles	82.7%

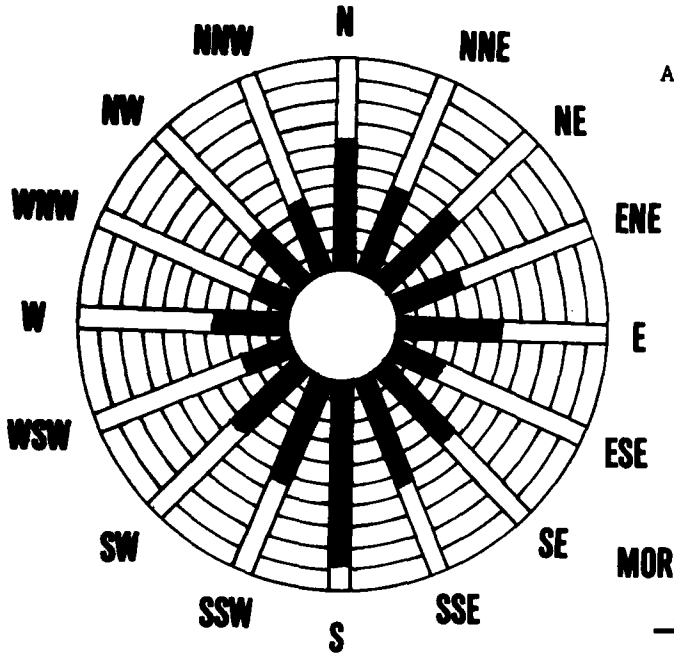
*Indicates data through Nov 79

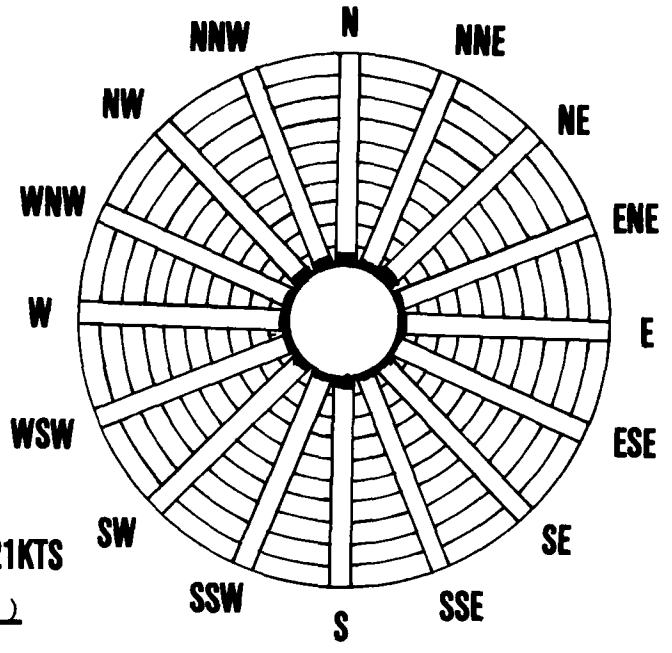
CALM (22.9 %)

LESS THAN 11KTS (71.4 %)

11KTS TO 21KTS (5.7 %)

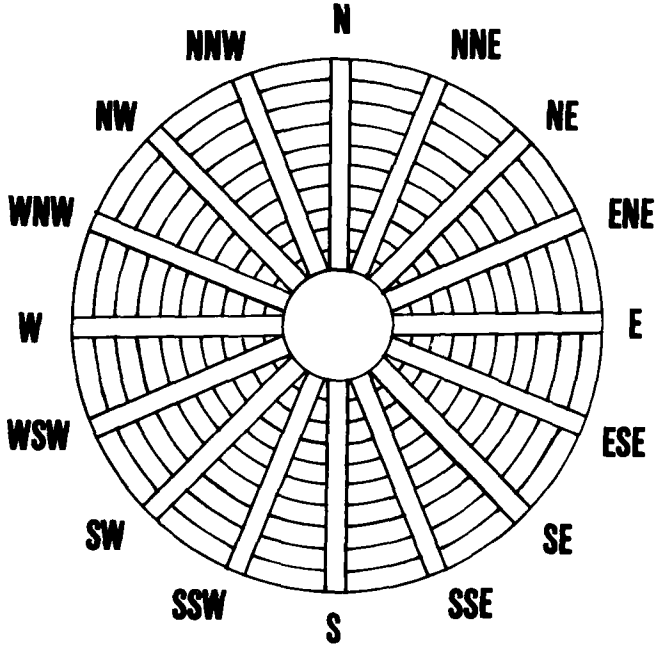
AUGUST





MORE THAN 21KTS

(0.0 %)



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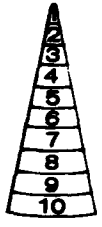


CLIMATOLOGICAL DATA
Scott AFB, Illinois (SEPTEMBER)
DATA FROM RUSSWO JAN 1938-DEC 1972

Temperature:

Mean Daily	69.2°F
Mean daily maximum	80.4°F
Mean daily minimum	57.7°F
*Extreme maximum	103.0°F (1954)
*Extreme minimum	27.0°F (1942)
Mean number of hours 32°F or lower	125.3 Hours
Mean number of hours 0°F or lower	10.1 Hours

Precipitation:

*Mean monthly amount	3.12 inches
*Greatest monthly amount	9.46 inches (1945)
*Minimum monthly amount	.10 inches (1940)
*Greatest amount in 24 hours	3.62 inches (1954)
Mean number of days with measurable amount	7.17 days

Snowfall:

*Mean total snowfall	None
*Maximum monthly snowfall	None
*Maximum snowfall in 24 hours	None
Mean number of days with measurable snowfall	None
Mean number of days with greater than 1 inch snowfall	None

Surface Winds:

Mean Hourly speed	5.4 Kts
*Maximum recorded speed (gusts)	49.0 Kts NW (1954)
Frequency of windspeed greater than 27 Kts	0.0%
Prevailing direction S (Primary)	N (secondary)

Weather Conditions - Frequency of Occurrence from Hourly Observations:

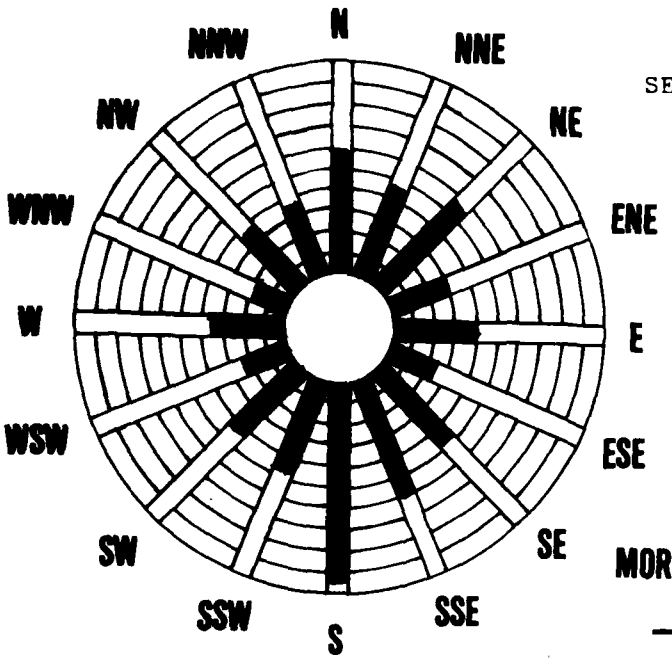
Rain and/or drizzle	6.0%
Freezing rain and/or drizzle	None
Snow or sleet	None
Mean number of days thunderstorms	4.25 days

Percent Frequency of Occurrence-Ceiling + Visibility:

Less than 200' x 1/2 mile	.6%
Equal or greater than 200' x 1/2 mile but less than 500' x 1 mile	1.0%
Equal or greater than 500' x 1 mile but less than 1500' x 3 miles	6.7%
Equal or greater than 1500'x 3 miles but less than 5000' x 5 miles	13%
Equal or greater than 5000' x 5 miles	78.7%

*Indicates data through Nov 79

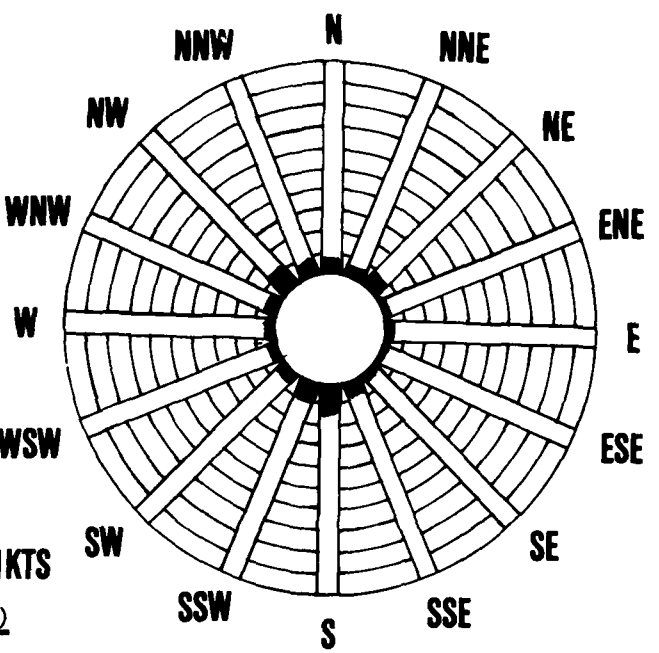
CALM (20.4 %)



LESS THAN 11KTS (69.4 %)

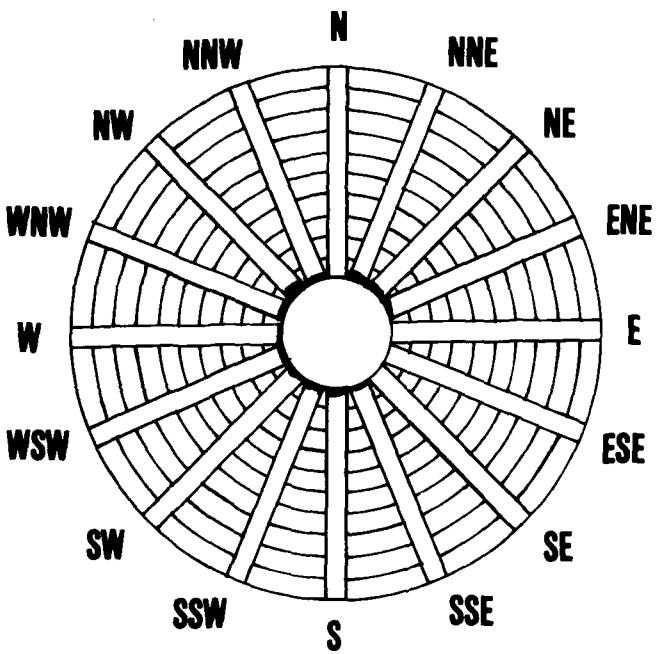
SEPTEMBER

11KTS TO 21KTS (10.1 %)

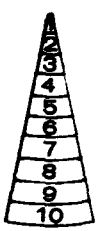


MORE THAN 21KTS

(0.1 %)



SCALE

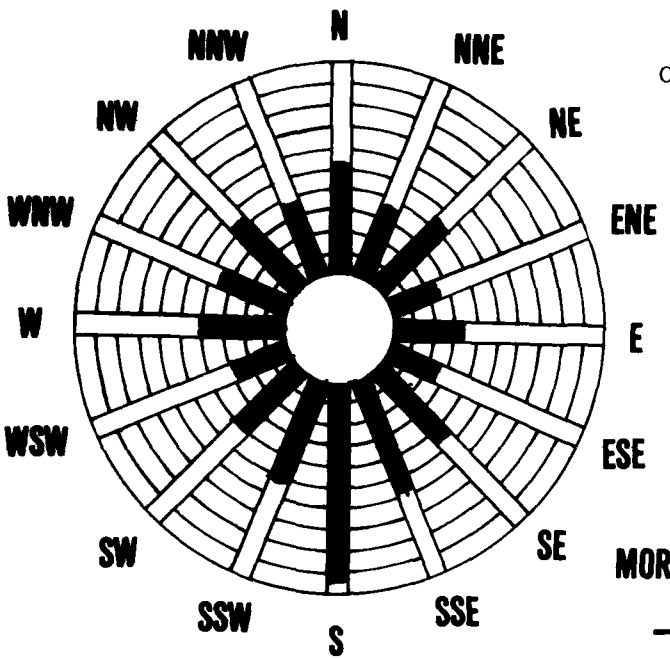


CLIMATOLOGICAL DATA
Scott AFB, Illinois (OCTOBER)
DATA FROM RUSSWO JAN 1938-DEC 1972

Temperature:	
Mean Daily	58.7°F
Mean daily maximum	70.3°F
Mean daily minimum	46.3°F
*Extreme maximum	95.0°F (1953)
*Extreme minimum	24.0°F (1964/76)
Mean number of hours 32°F or lower	5.2 Hours
Mean number of hours 0°F or lower	33.0 Hours
Precipitation:	
*Mean monthly amount	2.53 inches
*Greatest monthly amount	6.80 inches (1949)
*Minimum monthly amount	.11 inches (1944)
*Greatest amount in 24 hours	2.55 inches (1949)
Mean number of days with measurable amount	7.19 days
Snowfall:	
*Mean total snowfall	Trace
*Maximum monthly snowfall	Trace
*Maximum snowfall in 24 hours	Trace
Mean number of days with measurable snowfall	None
Mean number of days with greater than 1 inch snowfall	None
Surface Winds:	
Mean Hourly speed	5.9 Kts
*Maximum recorded speed (gusts)	54.0 SW (1967)
Frequency of windspeed greater than 27 Kts	0.0%
Prevailing direction S (Primary)	SSE (secondary)
Weather Conditions - Frequency of Occurrence from Hourly Observations:	
Rain and/or drizzle	6.7%
Freezing rain and/or drizzle	None
Snow or sleet	0.1%
Mean number of days thunderstorms	2.42 days
Percent Frequency of Occurrence-Ceiling + Visibility:	
Less than 200' x 1/2 mile	.7%
Equal or greater than 200' x 1/2 mile but less than 500' x 1 mile	1.4%
Equal or greater than 500' x 1 mile but less than 1500' x 3 miles	7.2%
Equal or greater than 1500'x 3 miles but less than 5000' x 5 miles	14.8%
Equal or greater than 5000' x 5 miles	75.9%

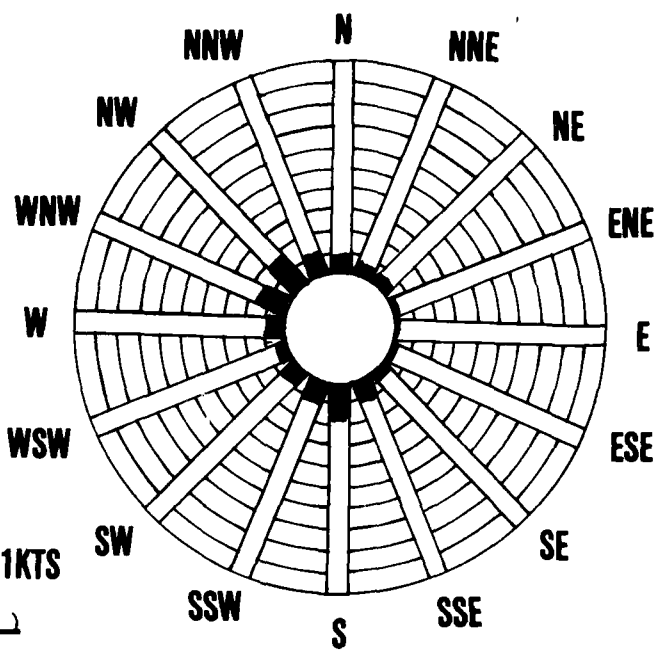
*Indicates data through Nov 79

CALM (18.2 %) LESS THAN 11KTS (68.2 %)



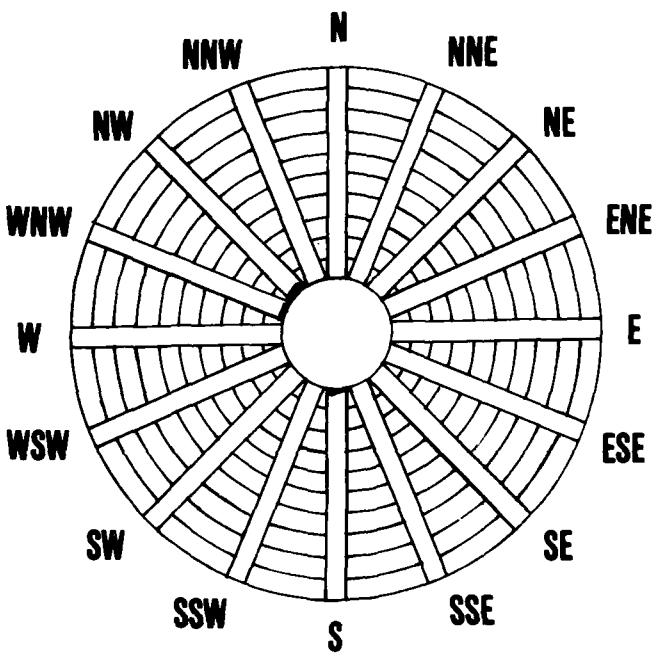
OCTOBER

11KTS TO 21KTS (13.3 %)

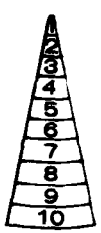


MORE THAN 21KTS

(0.3 %)



SCALE



CLIMATOLOGICAL DATA
Scott AFB, Illinois (NOVEMBER)
DATA FROM RUSSWO JAN 1938-DEC 1972

Temperature:

Mean Daily	44.3°F
Mean daily maximum	53.6°F
Mean daily minimum	35.0°F
*Extreme maximum	84.0°F (1950)
*Extreme minimum	4.0°F (1950)
Mean number of hours 32°F or lower	118.3 Hours
Mean number of hours 0°F or lower	7.1 Hours

Precipitation:

*Mean monthly amount	3.02 inches
*Greatest monthly amount	10.01 inches (1972)
*Minimum monthly amount	0.34 inches
*Greatest amount in 24 hours	6.67 inches
Mean number of days with measurable amount	8.04 inches

Snowfall:

*Mean total snowfall	1.6 inches
*Maximum monthly snowfall	12.7 inches (1951)
*Maximum snowfall in 24 hours	10.3 inches (1975)
Mean number of days with measurable snowfall	.81 days
Mean number of days with greater than 1 inch snowfall	.48 days

Surface Winds:

Mean Hourly speed	7.5 Kts (1951)
*Maximum recorded speed (gusts)	56.0 SW (1952)/56.0 Kts SSW (1951)
Frequency of windspeed greater than 27 Kts	.2%
Prevailing direction S (Primary)	NW (secondary)

Weather Conditions - Frequency of Occurrence from Hourly Observations:

Rain and/or drizzle	8.4%
Freezing rain and/or drizzle	.1%
Snow or sleet	2.1%
Mean number of days thunderstorms	1.29 days

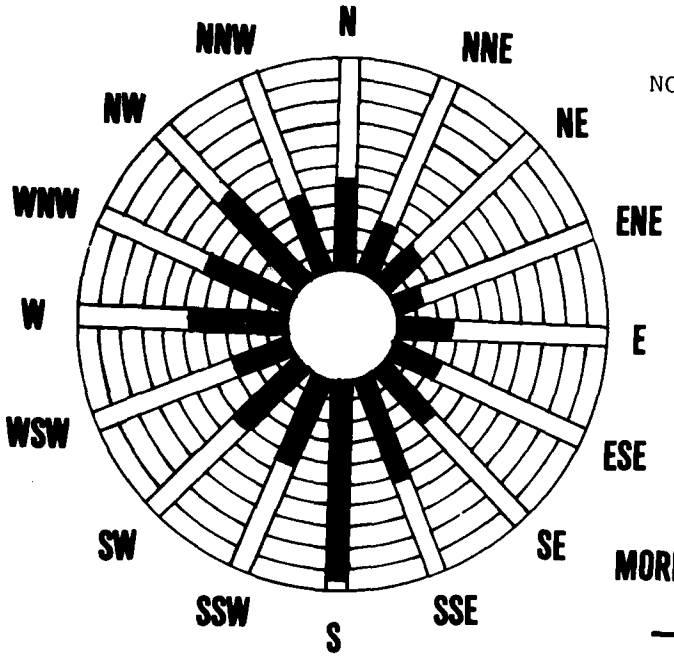
Percent Frequency of Occurrence-Ceiling + Visibility:

Less than 200' x 1/2 mile	.9%
Equal or greater than 200' x 1/2 mile but less than 500' x 1 mile	2.3%
Equal or greater than 500' x 1 mile but less than 1500' x 3 miles	11.3%
Equal or greater than 1500'x 3 miles but less than 5000' x 5 miles	23.7%
Equal or greater than 5000' x 5 miles	61.8%

*Indicates data through Nov 79

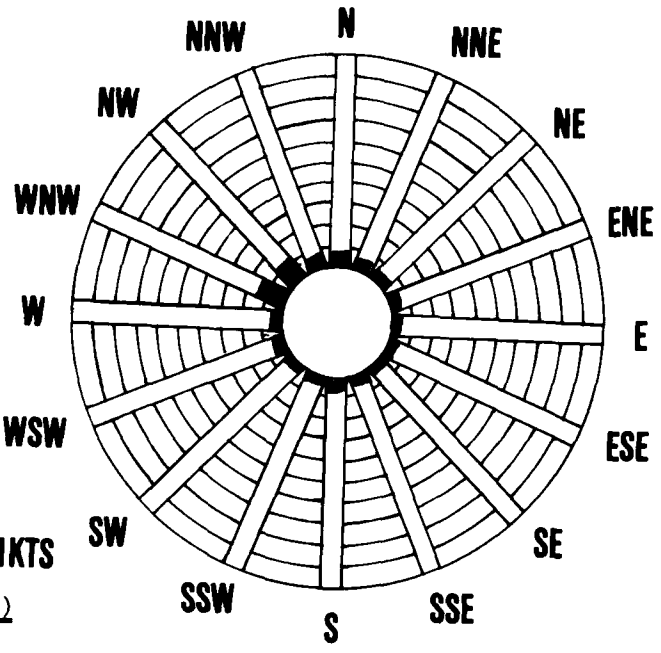
CALM (12.8 %)

LESS THAN 11KTS (63.5 %)



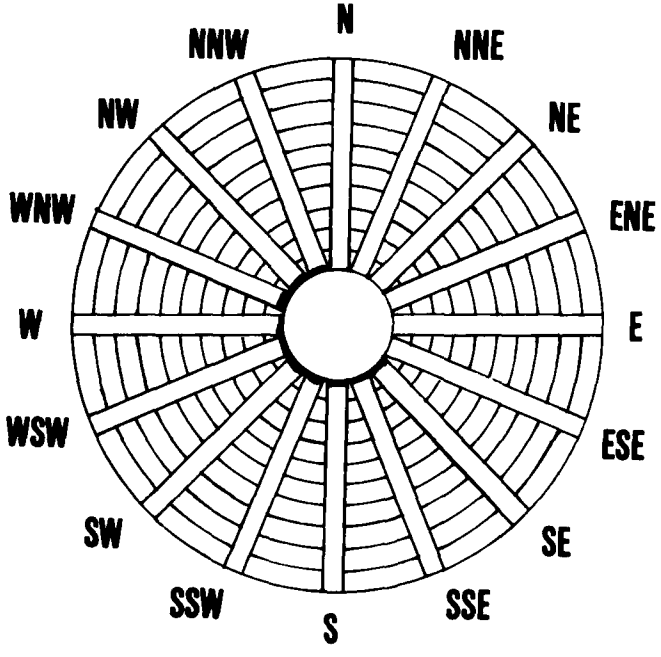
NOVEMBER

11KTS TO 21KTS (22.3 %)

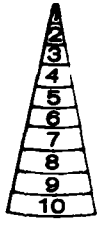


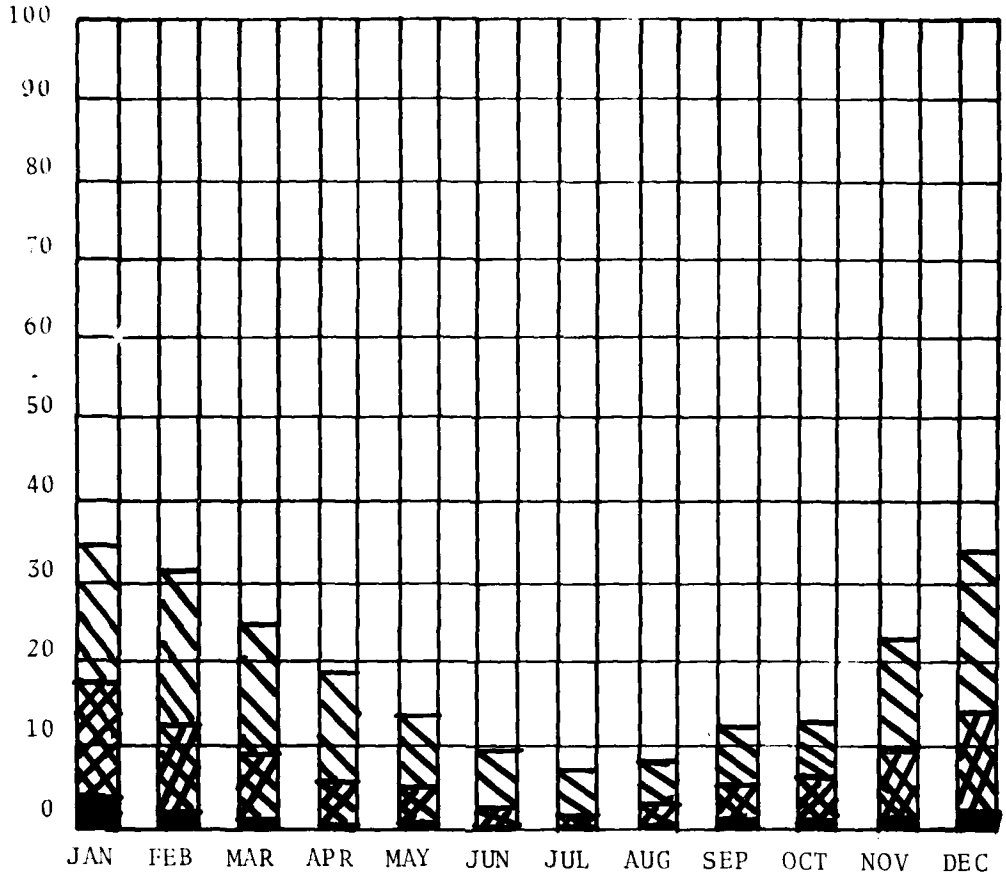
MORE THAN 21KTS

(1.4 %)



SCALE



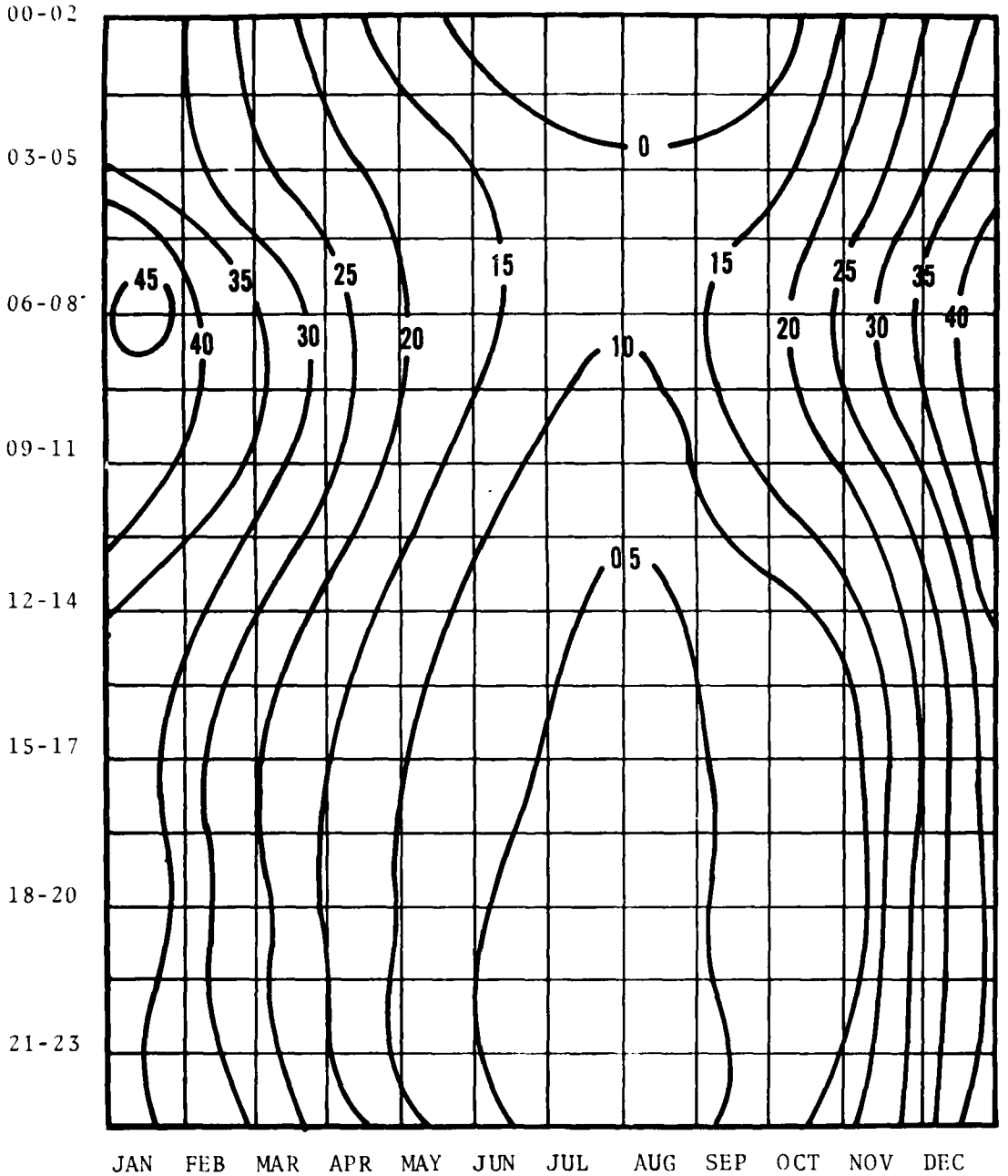


FREQUENCY OF OCCURRENCE CEILING/VISIBILITY

DATA FROM RUSSWO JAN 1938-DEC 1972

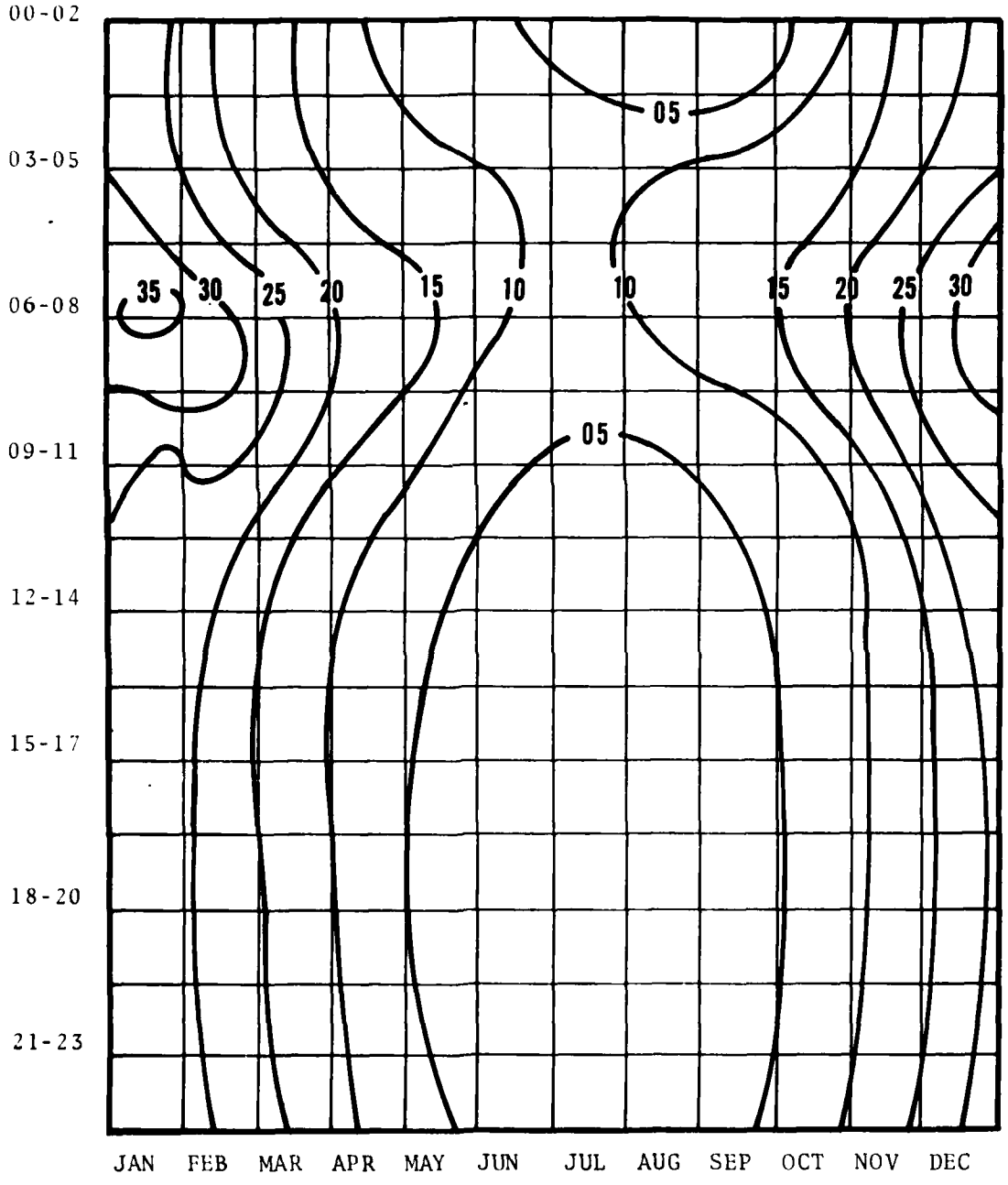
MONTH	200/ 1/2 CAT A	200/ 1/2 1000/ 2 CAT B	1000/ 2 3000/ 3 CAT C	3000/ 3 CAT D
JAN	2.4%	14.6%	17.5%	65.5%
FEB	1.2	11.6	17.9	69.3
MAR	.9	8.4	15.4	75.3
APR	.4	5.5	11.9	82.2
MAY	.3	4.1	9.1	86.5
JUN	.2	2.3	7.1	90.4
JUL	.2	1.7	4.4	93.7
AUG	.3	1.9	4.8	92.3
SEP	.6	4.3	7.2	87.9
OCT	.7	5.3	7.6	86.4
NOV	.9	8.2	14.0	76.9
DEC	1.9	12.4	19.3	66.4

DATA FROM RUSSWO JAN 1938-DEC 1964



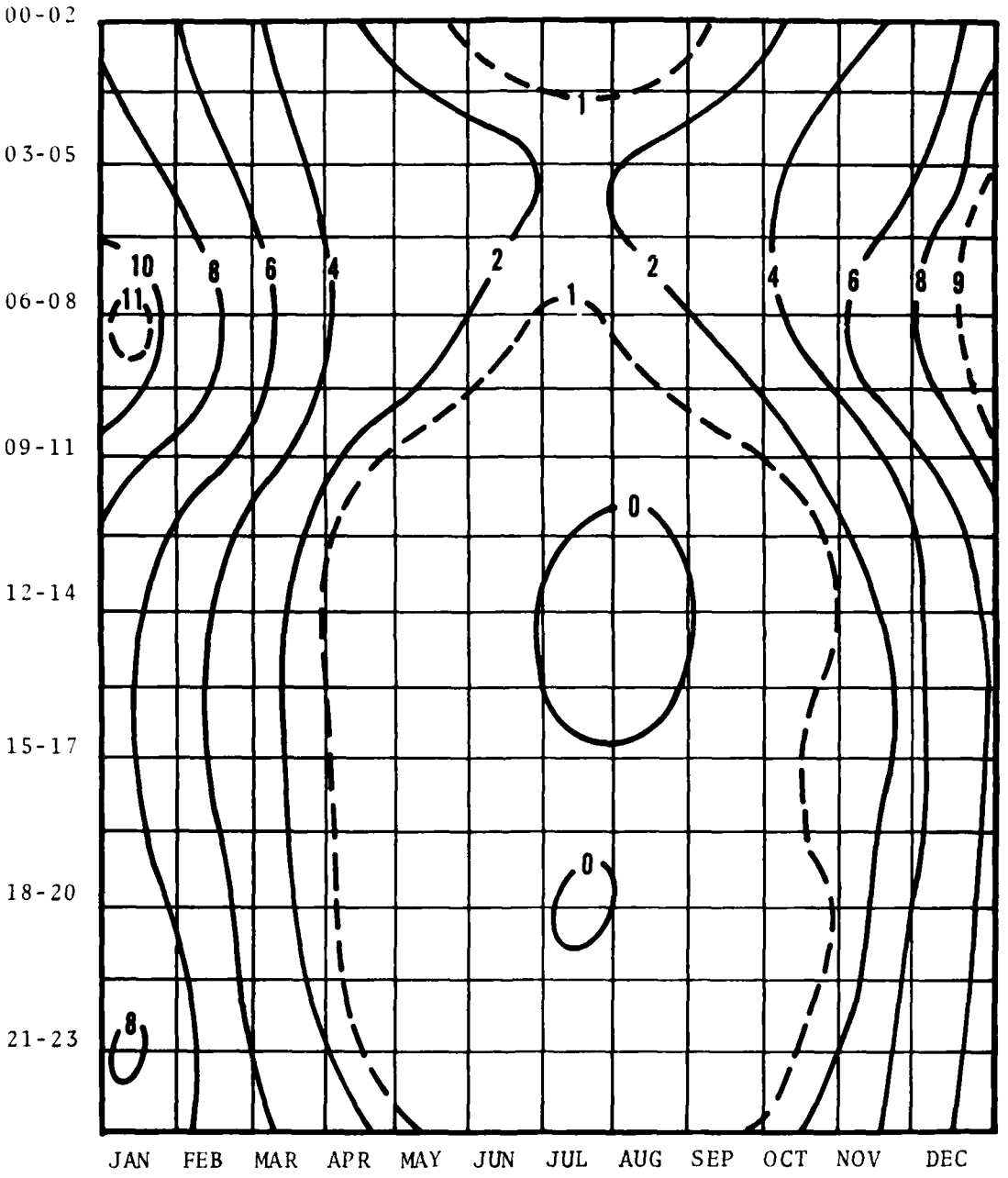
FREQUENCY (%) OF CEILING/VISIBILITY
LESS THAN 2500'/3

DATA FROM RUSSWO JAN 1938-DEC 1964



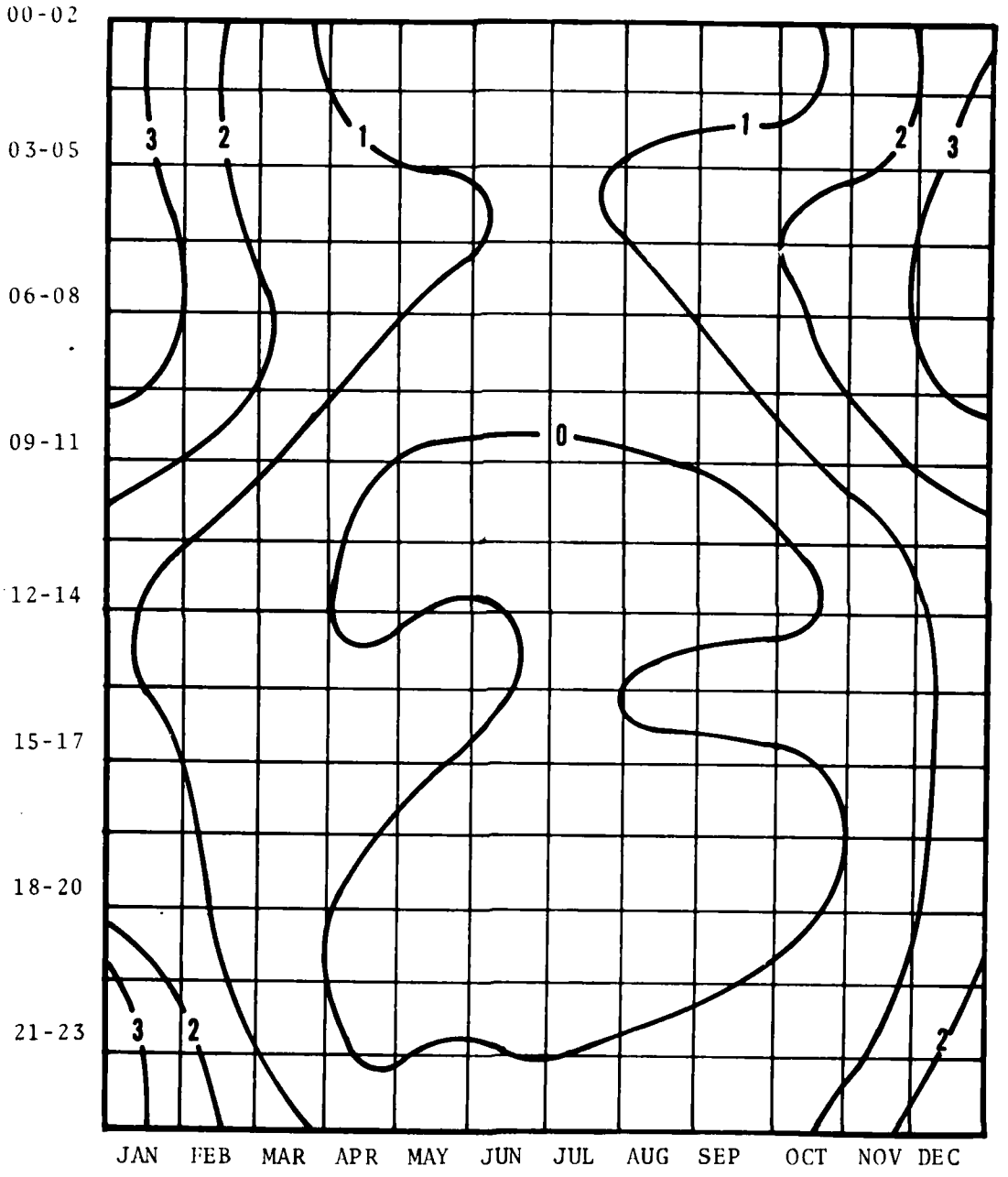
FREQUENCY (%) OF CEILING/VISIBILITY
LESS THAN 1500'/3

DATA FROM RUSSWO JAN 1938-DEC 1964

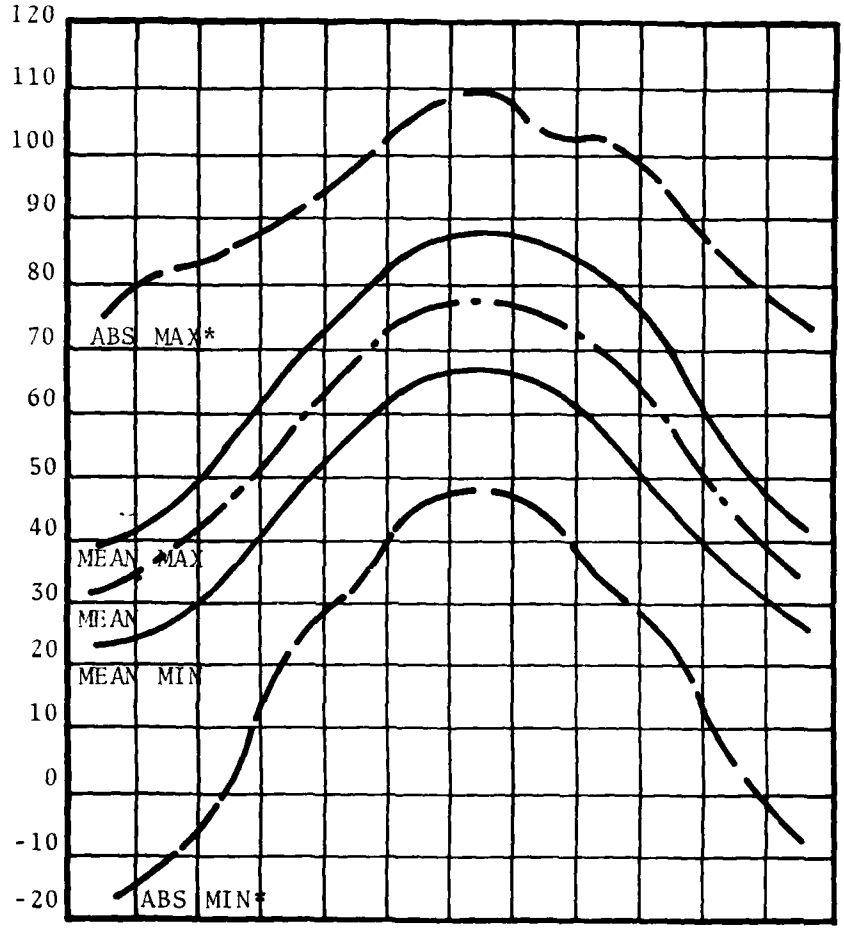


FREQUENCY (%) OF CEILING/VISIBILITY
LESS THAN 500'/1

DATA FROM RUSSWO JAN 1938-DEC 1964



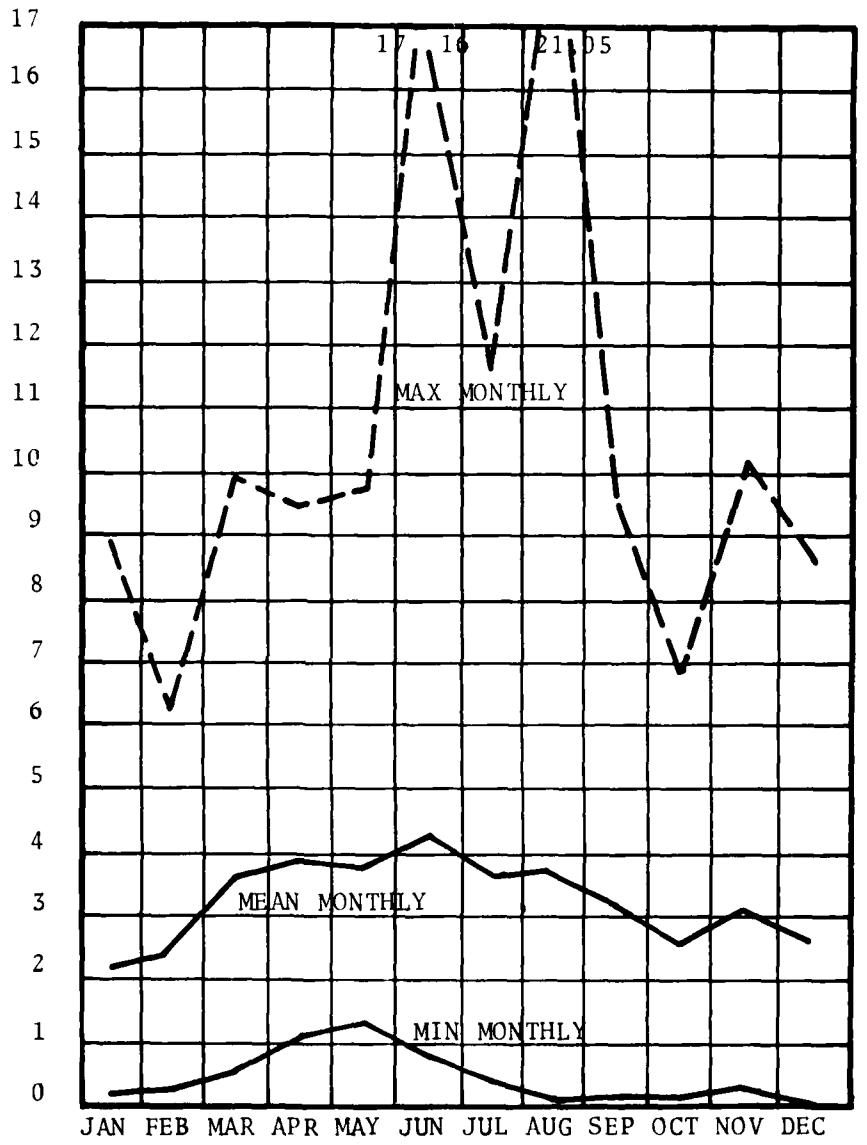
FREQUENCY (%) OF CEILING/VISIBILITY
LESS THAN 200'/1/2



* Indicates data from JAN 1938-AUG 1978

DATA FROM RUSSWO JAN 1938-DEC 1972
TEMPERATURES

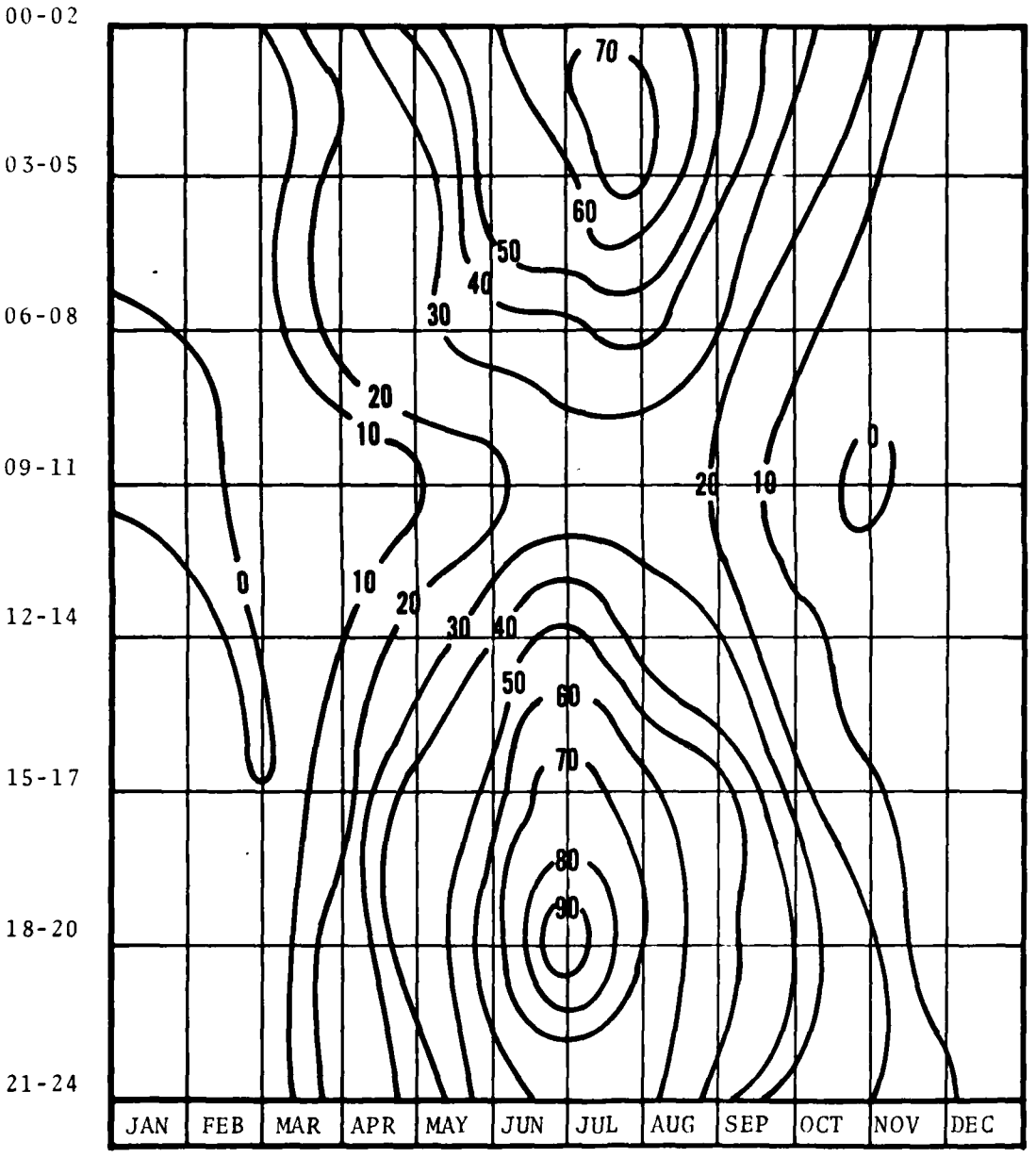
	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
MEAN DAILY MAX	38.9	43.7	53.1	65.8	75.6	85.0	88.3	86.9	80.4	70.3	53.6	42.8
MEAN DAILY	30.7	35.2	43.6	55.8	65.2	74.7	78.0	76.3	69.2	58.7	44.5	35.0
MEAN DAILY MIN	22.3	26.3	33.9	45.5	54.7	64.1	67.4	65.6	57.7	46.9	35.0	27.1



DATA FROM RUSSWO JAN 1939-NOV 1979
PRECIPITATION (INCHES)

	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
MEAN MONTHLY PRECIP	2.29	2.31	3.54	3.96	3.91	4.22	3.69	3.78	3.12	2.53	3.02	2.77
MONTHLY MEAN SNOWFALL	5.0	3.4	3.8	.6	0	0	0	0	0	T	1.6	2.7

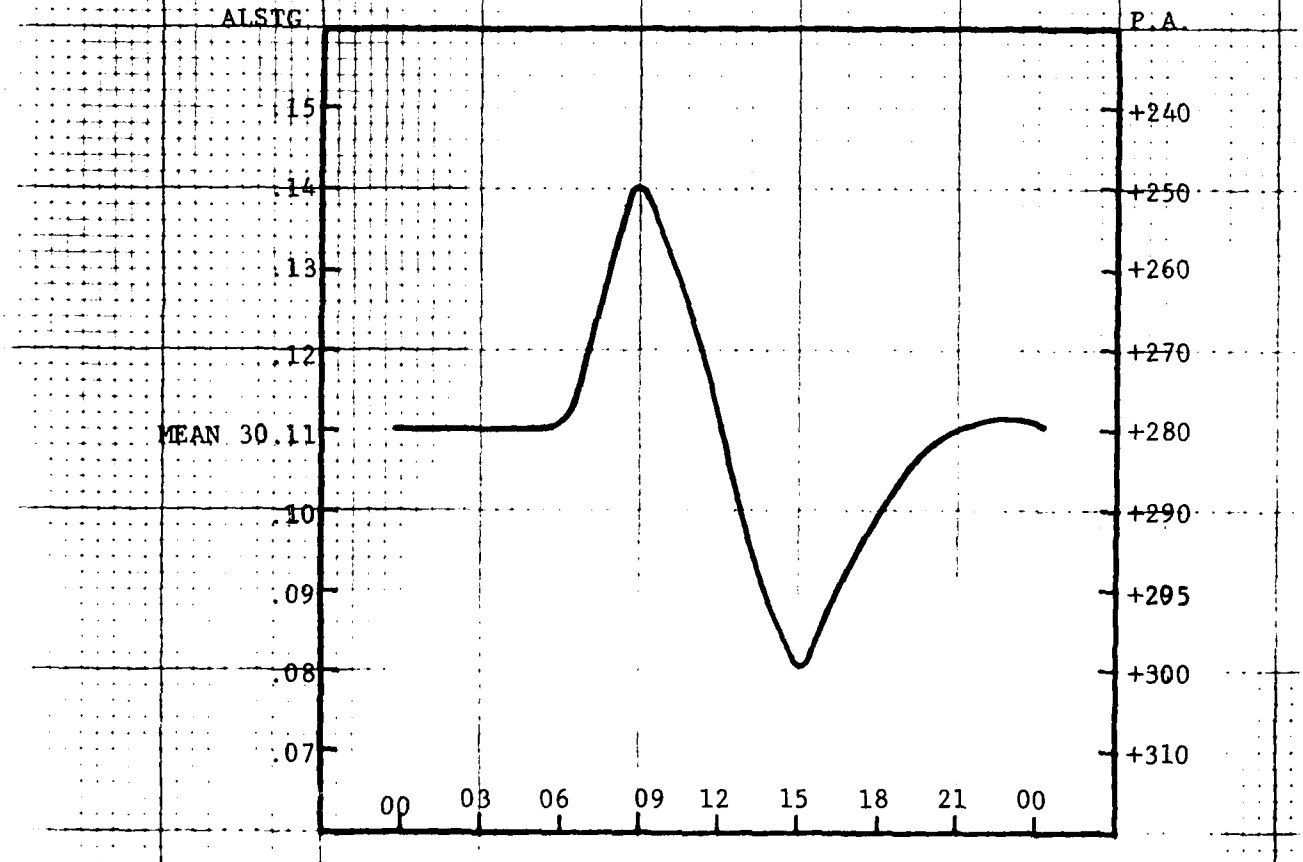
DATA FROM RUSSWO JAN 1938-DEC 1964



NUMBER OF OBSERVATIONS WITH THUNDERSTORMS DURING 25 YEAR PERIOD

DECEMBER

DIURNAL PRESSURE CHANGE

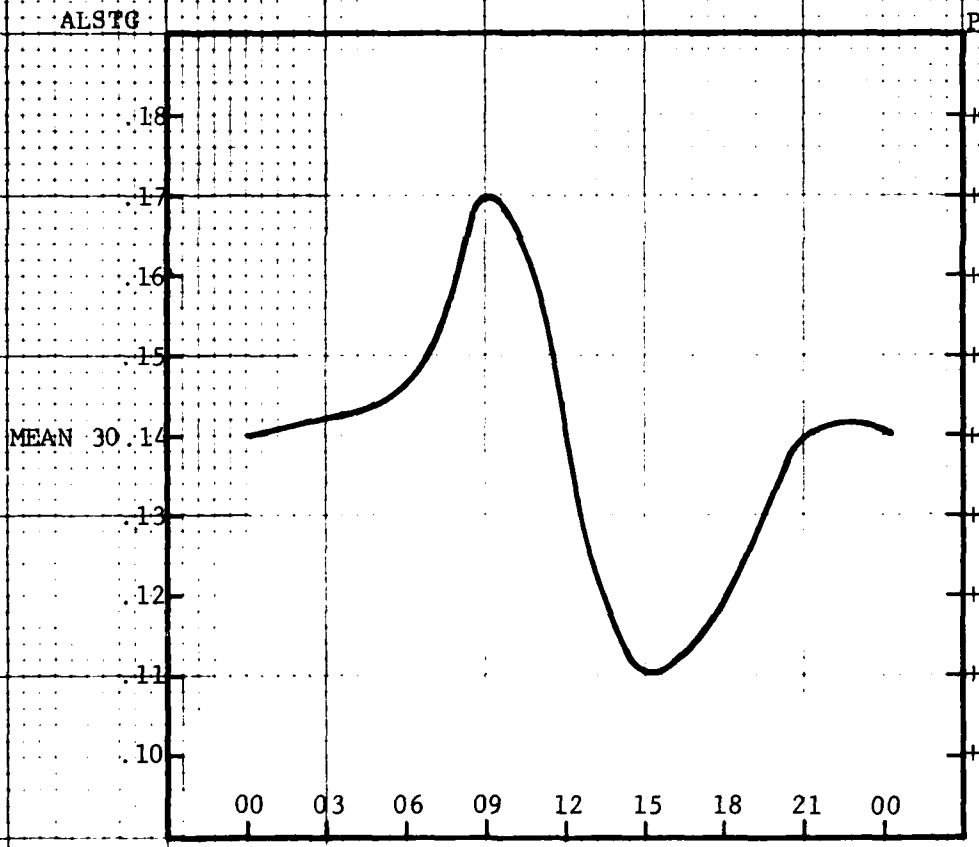


STANDARD DEVIATION: .25

DATA FROM RUSSWO JAN 1938 - DEC 1972

JANUARY

DIURNAL PRESSURE CHANGE

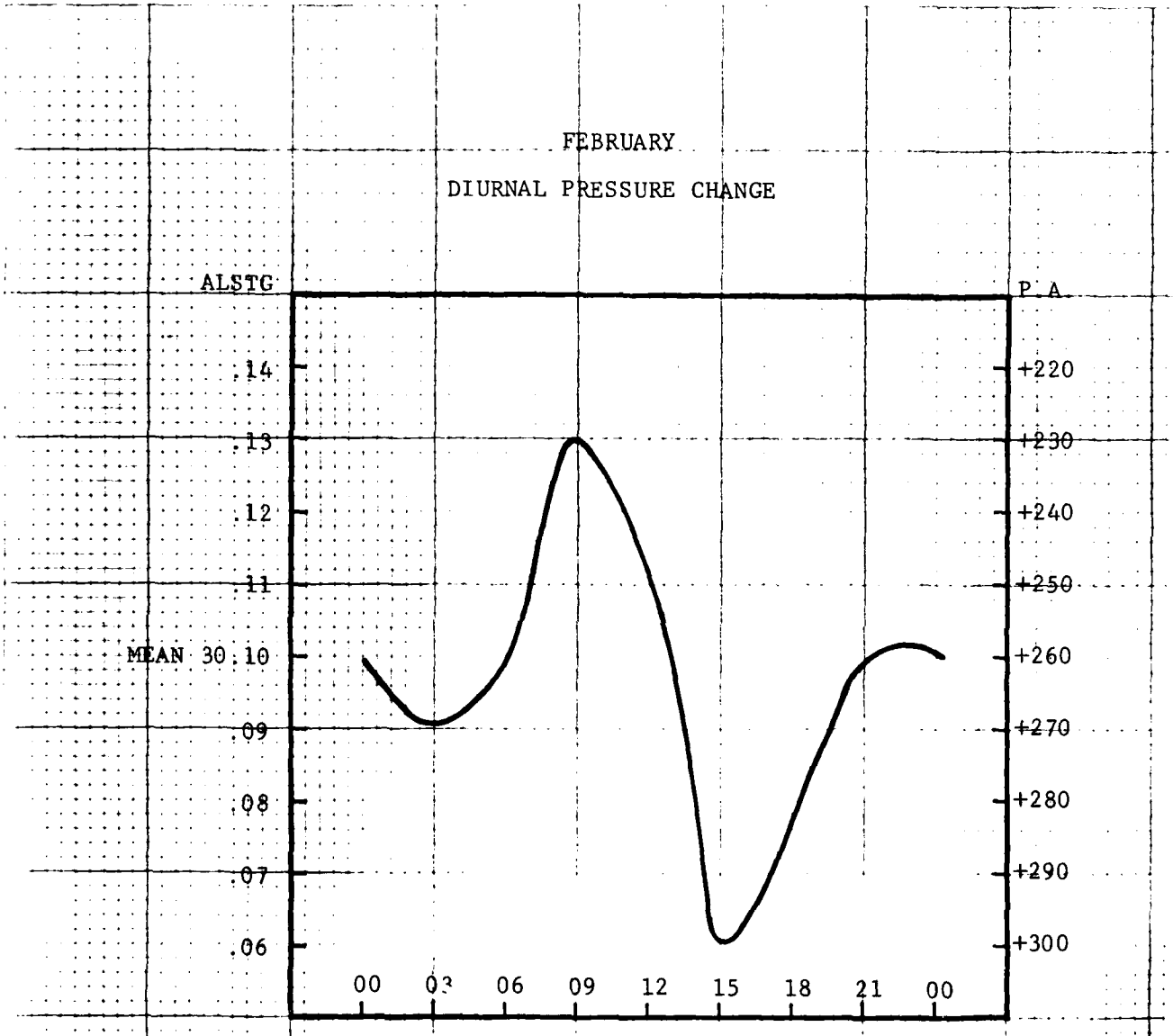


STANDARD DEVIATION: .25

DATA FROM RUSSWO JAN 1938 - DEC 1972

FEBRUARY

DIURNAL PRESSURE CHANGE

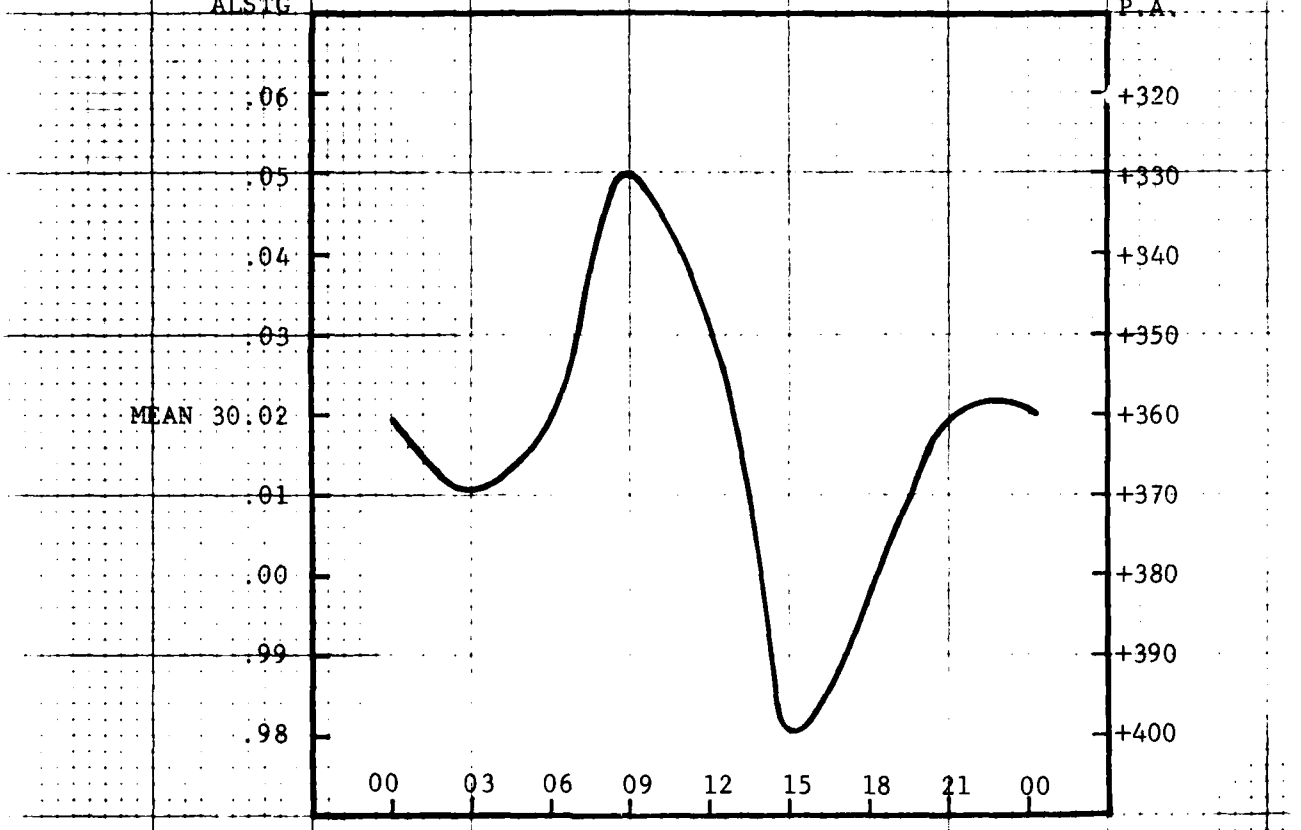


STANDARD DEVIATION: .25

DATA FROM RUSSWO JAN 1938-1972

MARCH

DIURNAL PRESSURE CHANGE

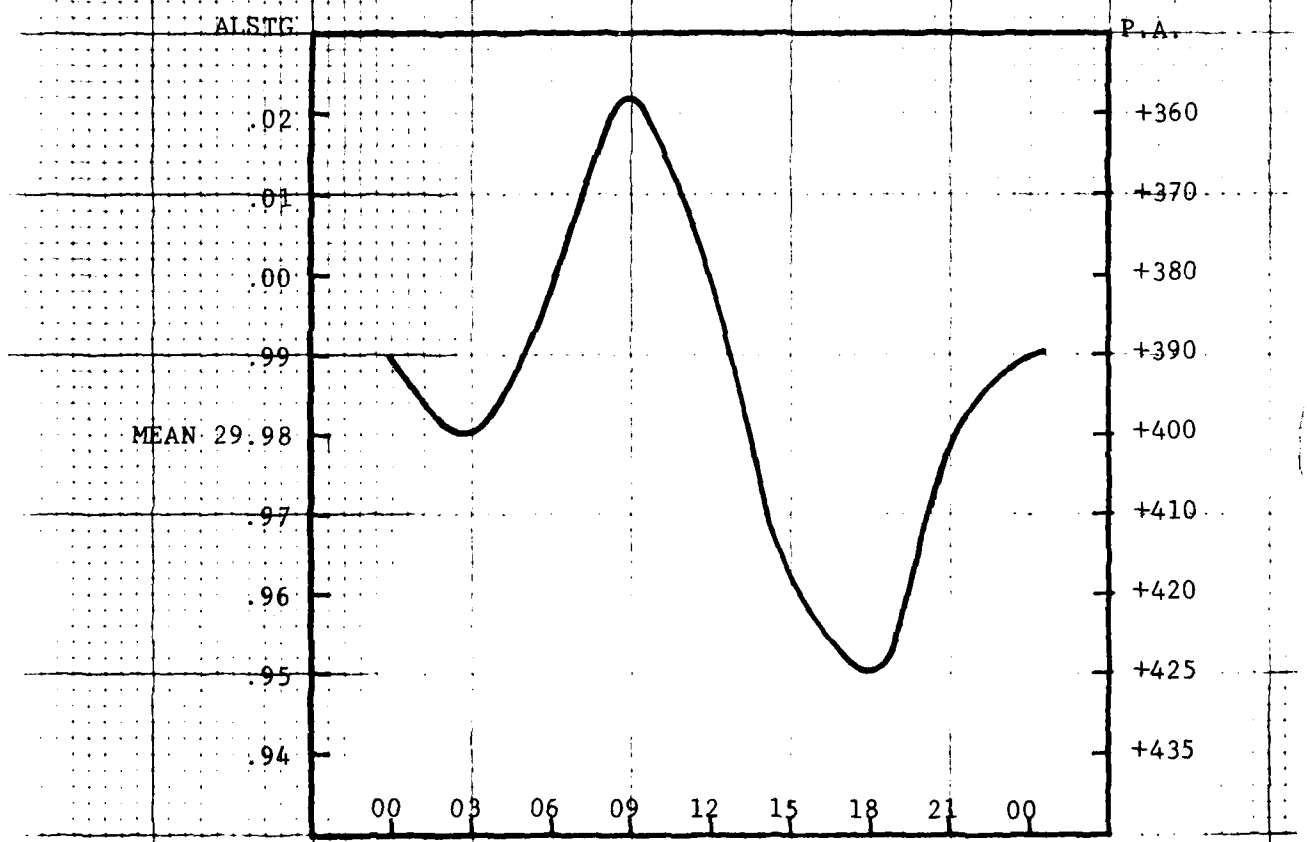


STANDARD DEVIATION: .25

DATA FROM RUSSWO JAN 1938 - DEC 1972

APRIL

DIURNAL PRESSURE CHANGE

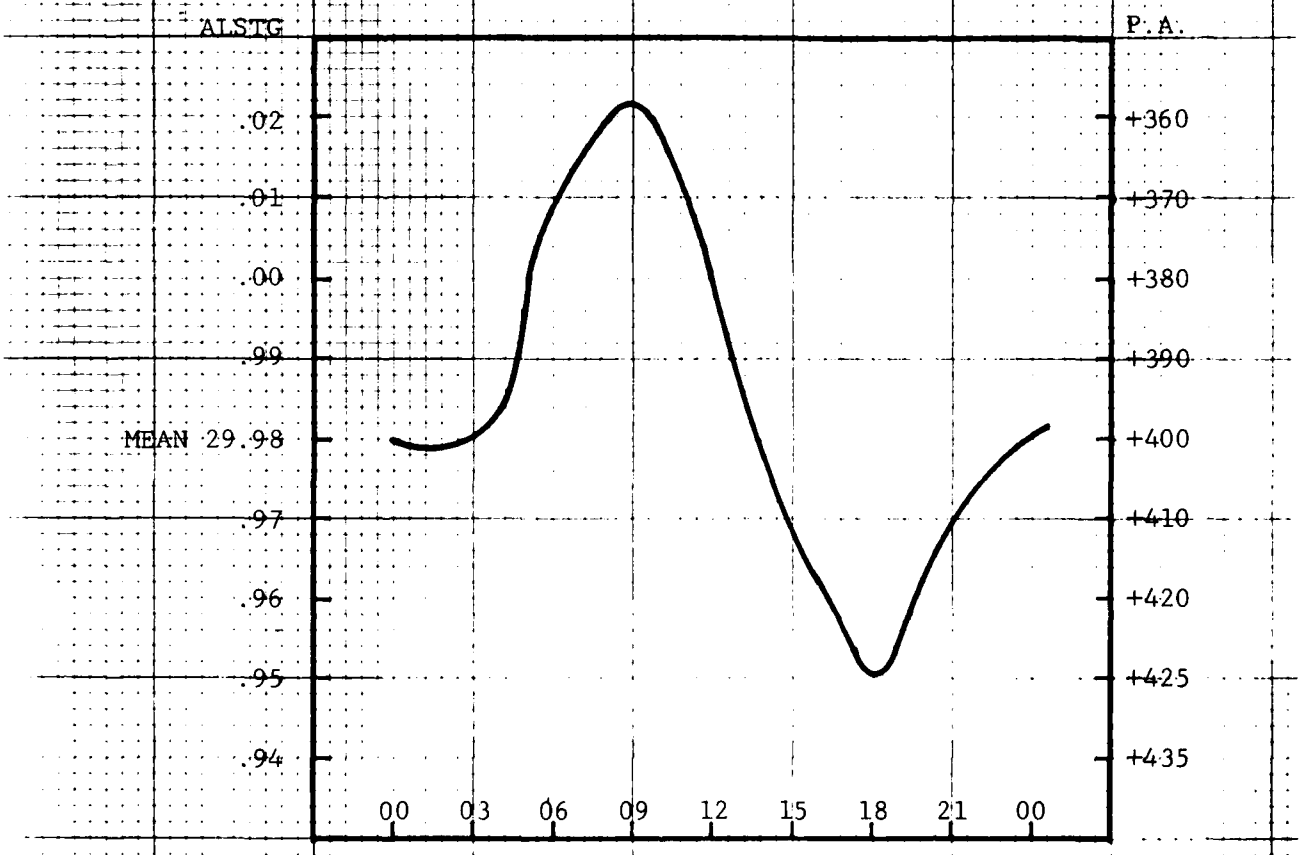


STANDARD DEVIATION: .21

DATA FROM RUSSWO JAN 1938 - DEC 1972

MAY

DIURNAL PRESSURE CHANGE

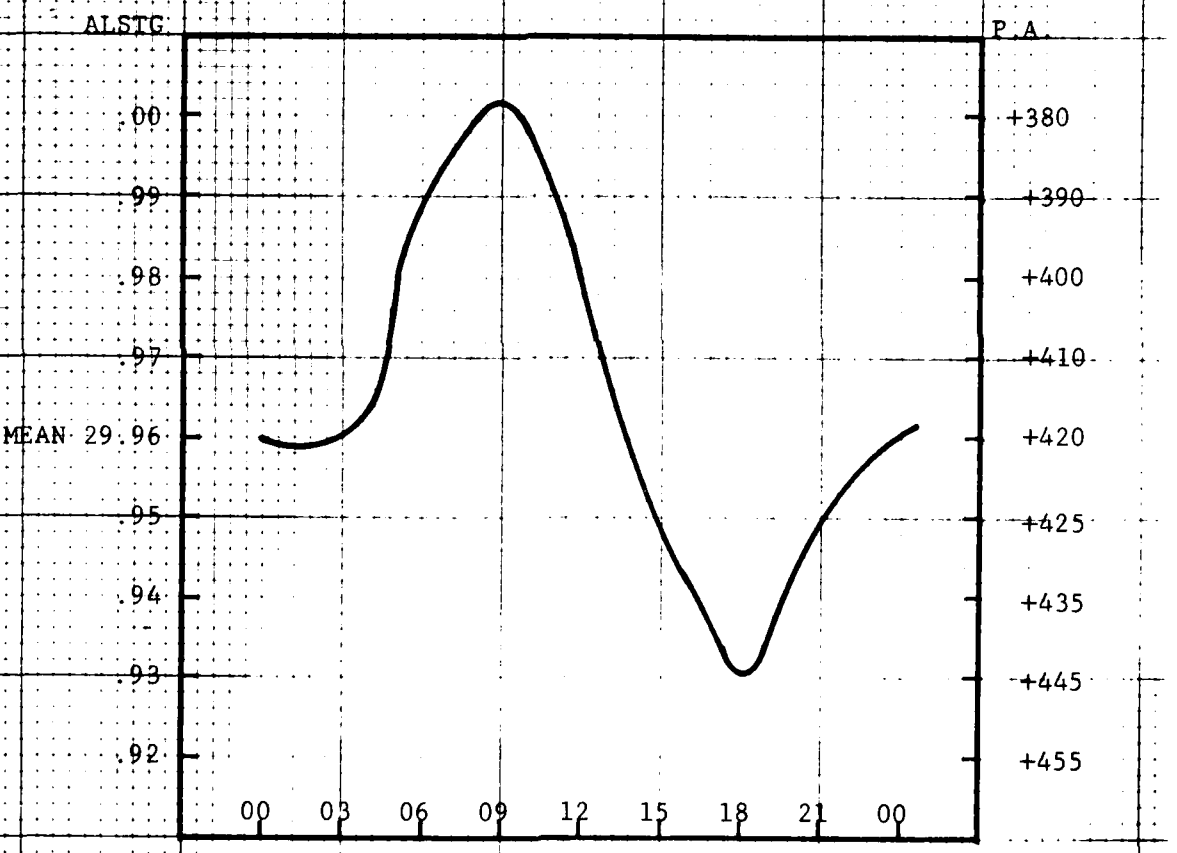


STANDARD DEVIATION: .15

DATA FROM RUSSWO JAN 1938 - DEC 1972

JUNE

DIURNAL PRESSURE CHANGE

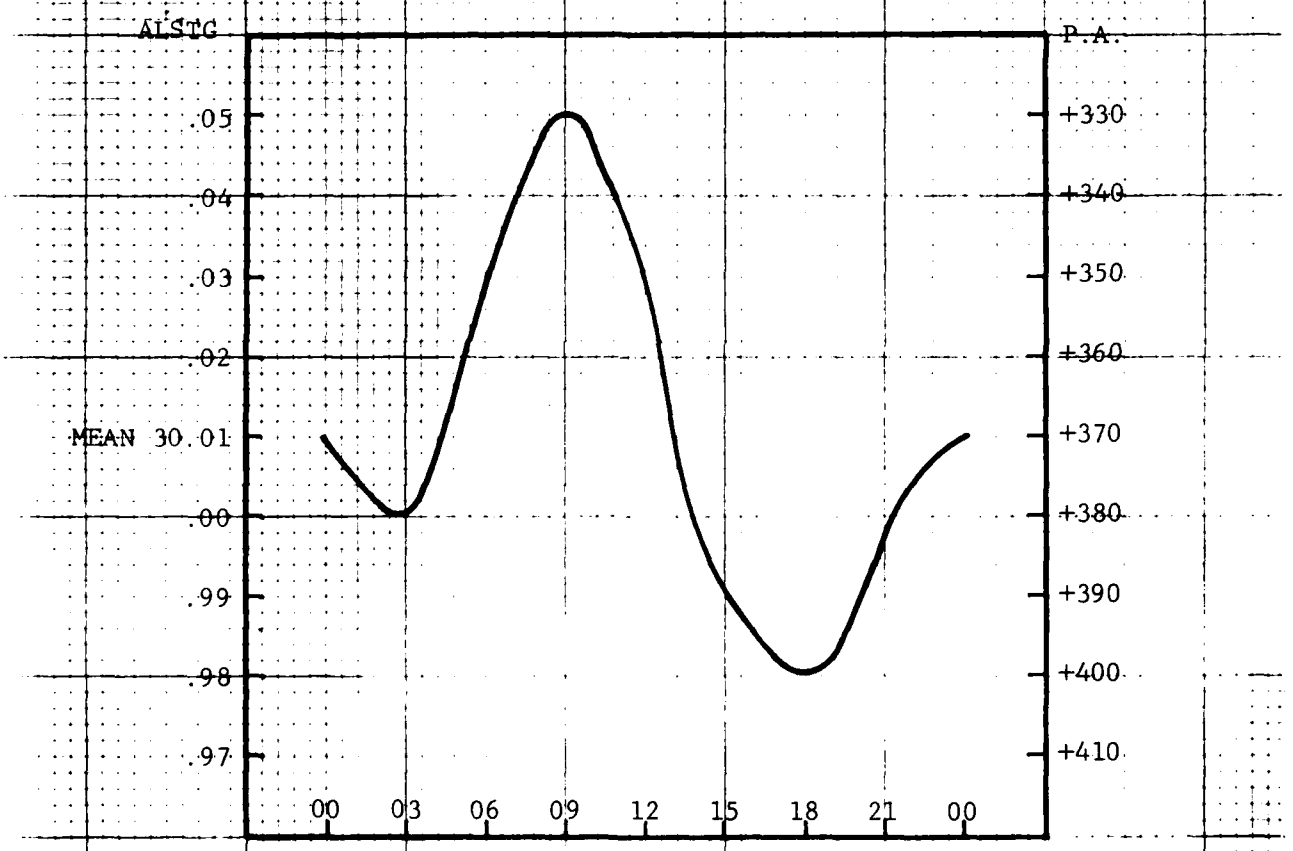


STANDARD DEVIATION: .10

DATA FROM RUSSWO JAN 1938 - DEC 1972

JULY

DIURNAL PRESSURE CHANGE

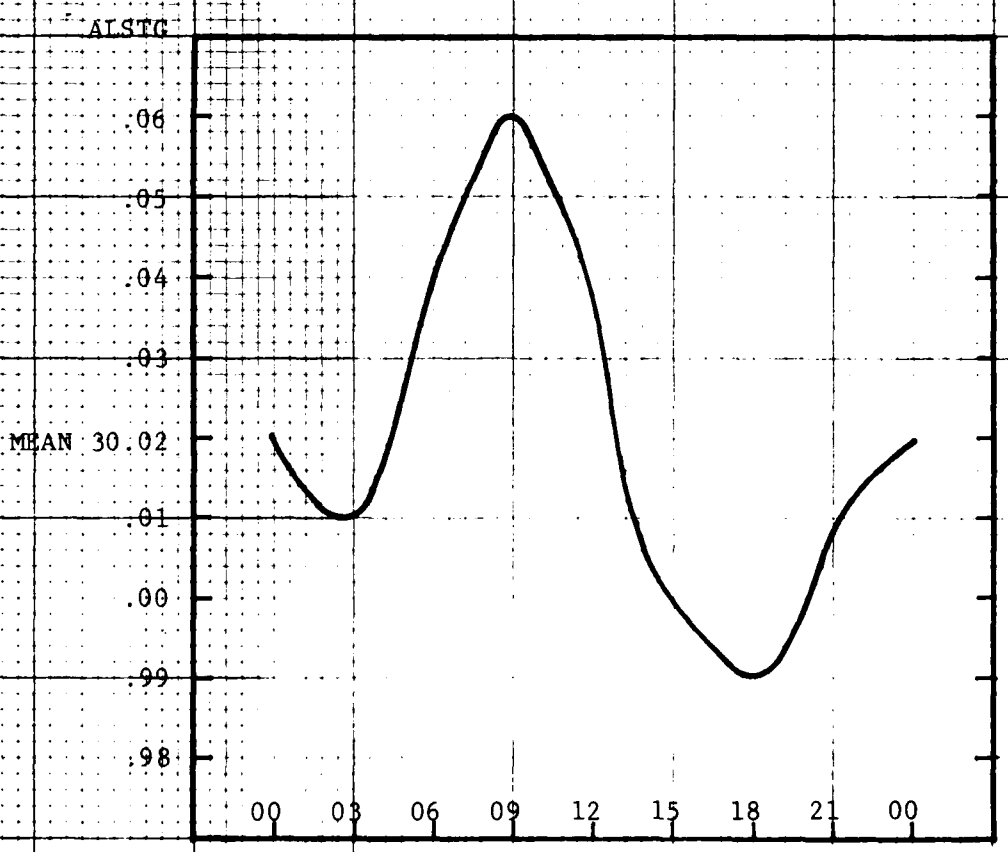


STANDARD DEVIATION: .10

DATA FROM RUSSWO JAN 1938 - DEC 1972

AUGUST

DIURNAL PRESSURE CHANGE

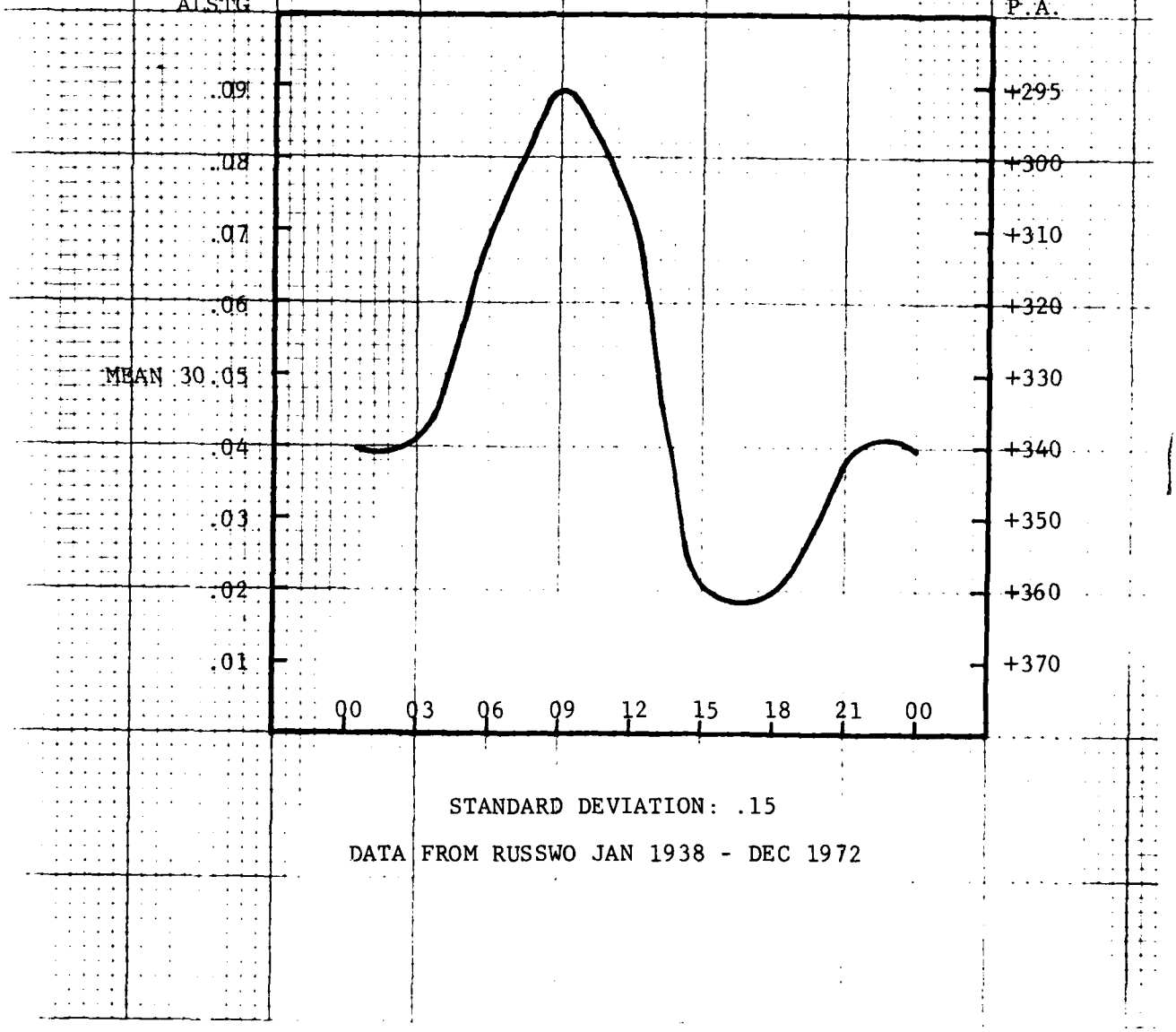


STANDARD DEVIATION: .10

DATA FROM RUSSWO JAN 1938 - DEC 1972

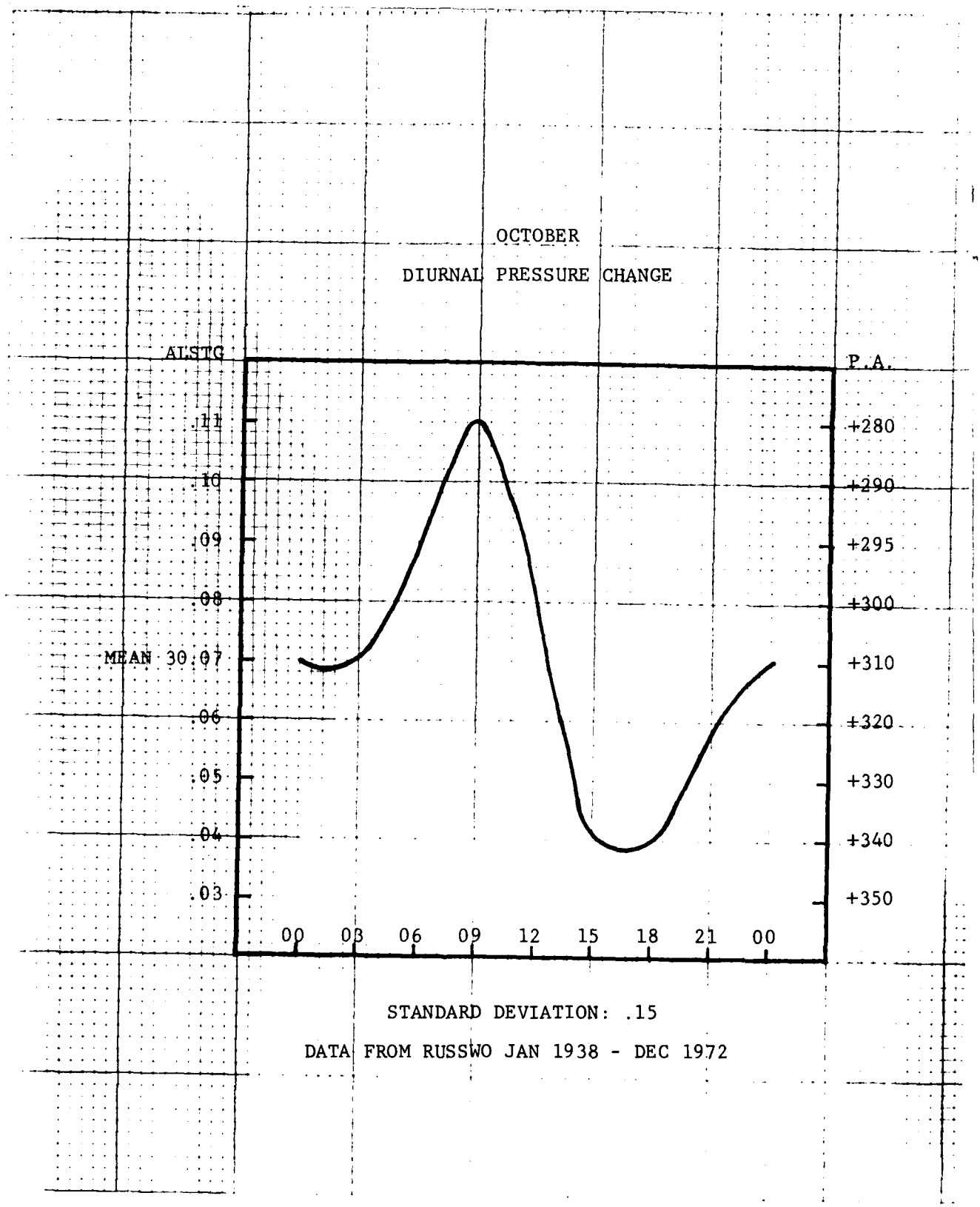
SEPTEMBER

DIURNAL PRESSURE CHANGE



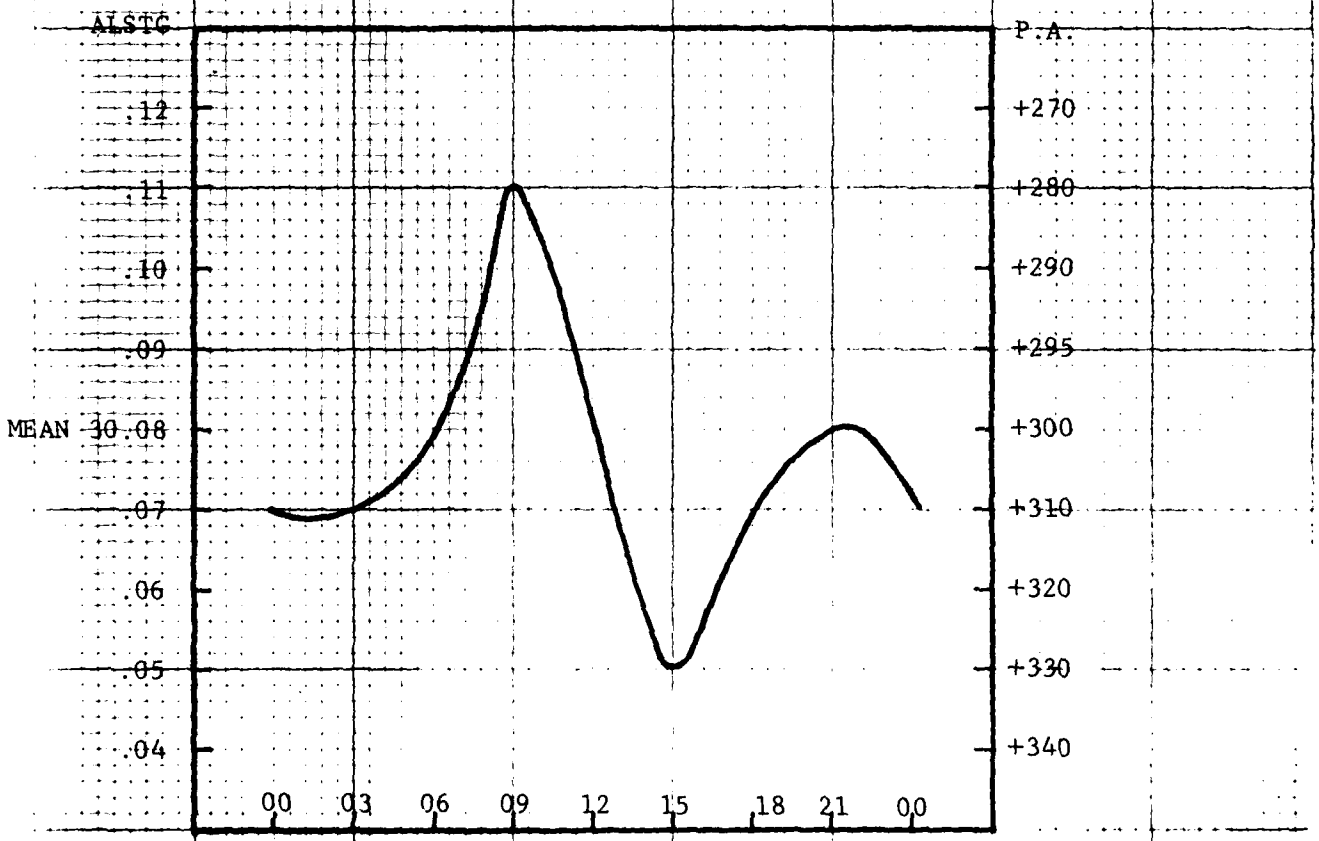
STANDARD DEVIATION: .15

DATA FROM RUSSWO JAN 1938 - DEC 1972


OCTOBER
DIURNAL PRESSURE CHANGE
ALSTG
P.A.
.11
.10
.09
.08
MEAN 30.07
.06
.05
.04
.03
+280
+290
+295
+300
+310
+320
+330
+340
+350
00
03
06
09
12
15
18
21
00
STANDARD DEVIATION: .15
DATA FROM RUSSWO JAN 1938 - DEC 1972

NOVEMBER

DIURNAL PRESSURE CHANGE



STANDARD DEVIATION: .25

DATA FROM RUSSWO JAN 1938 - DEC 1972

3-4. Time Tested Forecasting Techniques.

a. Winter

1) Forecast Gulf stratus ceilings below 3000 feet to advect into the Scott AFB area 20-24 hours after Houston, Texas gets the stratus ceilings. This will happen when a high pressure system is in the SE U.S., usually over the Georgia-Alabama area (See Figure 3).

2) To forecast gradient wind gusts over 25 knots use the FDUS wind progs at 3000 and 6000 feet for the desired time period. Use the formula 4/10 (3000 ft. + 6000 ft. winds). Note: Skies should not be cloudy as this tends to eliminate or decrease gusty winds.

3) Do not forecast post-frontal stratus to move out of the area or burn off until the 850MB trough has passed or 4-6 hours after the winds at surface level have shifted to the westsouthwest.

b. Spring/Summer

1) With 15-20 knots of wind from the southwest near the surface, thunderstorms will develop 35-40 miles southsouthwest of Scott AFB but will not reach Scott AFB. Note: This rule does not apply to frontal or squall line associated thunderstorms.

2) In the early Spring once Scott AFB has gone below minimums in fog forecast the ceiling/visibility to lift above minimums on the morning forecast when the surface temperature becomes moist adiabatic to the top of the inversion.

c. Airmass Thunderstorm Worksheet.

a. The Thunderstorm Worksheet was engineered by one of the Scott AFB forecasters to meet the problem of how to forecast for thunderstorm development and how to forecast the intensity and coverage of these thunderstorms. The forecaster goes step by step through the worksheet answering each question and circling the appropriate answer. If the data meets the required minimum level then it is circled all the way across that line (the orange, green, blue and red columns). Then when all the data levels have been answered the color columns are then totaled and related to the table of points on the reverse side of the worksheet. Each column's total points can be related to the point table. For example, orange column reads 70 points and green column totals 10 points. These totals relate to scattered storms within 60NM of Scott for the orange intensity and isolated storms within 60NM of Scott for the green intensity. See Appendix A for a copy of the Thunderstorm Worksheet and the instructions to follow using it.

3-5. Forecast Problems.

1) There is only one forecast problem at Scott AFB that affects the base mission; this is fog which decreases the prevailing visibility to less than 1/2 mile. This problem has been forwarded to 7th WW for evaluation and coordination with all available data.

3-6. Approved Forecast Studies.

1) Currently there are no approved forecast studies being conducted at Scott AFB.

APPENDIX A

INSTRUCTIONS FOR USE OF THUNDERSTORM PROBABILITIES GUIDE

1. Determine if the dewpoint temperature at 1200Z was or will be at least 40°F, or will reach 40°F by 1800Z. If not, terminate usage of this guide. If the answer is yes, proceed.

2. Check the R_1 and R_2 levels on the FOUS 65 KWBC bulletin, particularly the 1200Z and 1800Z times. If the average of the two levels is greater than 60%, proceed. If not, terminate usage of this guide.

3. Determine the amount of instability at 1200Z. If either the Totals Totals Index (TT), Showalter's Stability Index (SSI) or Lifted Index (LI) equal or exceed the values in item c(1), proceed. Otherwise terminate use of this guide. Use the most representative sounding (SLO, UMN, or LIT) or interpolate between soundings by using the 850 mb and 500 mb analysis facsimile charts, for obtaining the TT. The four-panel freezing level-relative humidity - stability chart can be used as a guide for the LI. The SSI must be obtained from the SKEW-T.

4. Predict the maximum temperature (TM) for the day.

5. Predict whether the maximum (TM) temperature will exceed the Inversion Breaking Temperature (IBT). Proceed as follows:

(a) 1010 forecast: Obtain the FDUS 1 6000 foot temperature for STL, place it on a SKEW-T and extend it dry adiabatically to the 1000 mb level (IBT). If this temperature is less than the predicted TM proceed to the next step. If not terminate usage of this guide.

(b) 1616 forecast: Find the warmest temperature on the inversion at the 1200Z sounding at SLO (72433). Determine the IBT by extending this temperature down to the surface adiabatically. If the IBT is less than TM, proceed to the next step. If it is greater than TM, terminate usage of this guide.

(c) 2222 forecast: Air mass thunderstorms within 60NM of Scott AFB will have formed by this time. However, storms may still advect in from the southwest, west, or northwest during the night. To anticipate this happening, perform items 1, 3, and 5(b) above using the 1200Z UMN (72349), TOP (72456), or OMA (72553) soundings, and perform radar watches of areas to the west.

6. Assimilate the points using the criteria (use only one line in each item).

7. Relate the sum of the points to proper category under "Summations", and forecast accordingly.

NOTE: The "Summations" are meant for air mass thunderstorm prediction and do not apply to squall line or frontal thunderstorms. However, the density and severity of thunderstorms associated with fronts and squall lines can be anticipated by using the criteria. To do so, simply convert the summation categories to tenths of coverage for the line or narrow area associated with fronts and squall lines. That is, 80-

100 equals 8 to 10 tenths coverage, 50 - 70 equals 5 to 7 tenths. The tornado met watch category can also be used. The problem will be more that of timing, since the thunderstorm "window" will usually be open over a shorter time period than during pure air mass conditions, usually on the order of two hours or less vrs six hours or more for the latter. Only continuity and extrapolation will help.

APPENDIX A (Atch 1)

THUNDERSTORM PROBABILITIES

NOTE: Besides threshold values below, the daily surface temperature forecast must exceed the SFC-600 MB inversion breaking temperature (warmest temperature of the inversion brought down to the surface) to allow thunderstorm formation.

CRITERIA (12Z)		POINTS ORANGE	GREEN	BLUE	RED
a.	(1) TD $\geq$ 40°F	10	0	0	0
	(2) $\geq$ 50°F	20	4	0	0
	(3) $\geq$ 55°F	30	8	2	0
	(4) $\geq$ 60°F	40	12	4	1
b.	(1) $\frac{R1 + R2}{2} \geq 60\%$	10	0	0	0
	(2) $\geq$ 80%	20	0	0	0
c.	INSTABILITY:				
	(1) LI $\leq$ 0, SSI $\leq$ 4	10	0	0	0
	TT $\geq$ 45				
	(2) LI $\leq$ -2, SSI $\leq$ 0	20	4	0	0
	TT $\geq$ 50				
	(3) LI $\leq$ -4, SSI $\leq$ -2	30	8	2	0
	TT $\geq$ 55				
	(4) LI $\leq$ -6, SSI $\leq$ -4	40	12	4	1
	TT $\geq$ 60				
d.	SEA LEVEL PRESSURE:				
	(1) $\leq$ 1012 MB	0	0	2	0
	(2) $\leq$ 1002 MB	0	0	4	1
e.	(1) WET BULB "0" BETWEEN 5,000' AND 11,000"	0	4	2	0
	(2) WET BULB "0" BETWEEN 7,000' AND 9,000'	0	8	4	0

f.	(1) SWEAT INDEX $\geq$ 300	0	0	2	0
	(2) SWEAT INDEX $\geq$ 400	0	0	4	1
g.	500 MB WIND $\geq$ 35 KNOTS	0	0	0	1
h.	LFC BETWEEN 800 AND 540 MB	0	0	0	1

SUMMATIONS

90 - 100	=	NUMEROUS STORMS WITHIN 60NM OF BLV (FORECAST "GRADU" GROUP FOR BLV)
50 - 70	=	SCATTERED STORMS WITHIN 60NM OF BLV (1010 TAF: FORECAST "INTER" IN AFTERNOON 1616 TAF: FORECAST "GRADU" IN AFTERNOON 2222 TAF: DEPENDS ON RADAR)
30 - 40	=	FEW STORMS WITHIN 60NM OF SCOTT AFB (1010 AND 1616 TAF'S: FORECAST "INTER" IN AFTERNOON 2222 TAF: DEPENDS ON RADAR)
10 - 20	=	ISOLATED STORMS WITHIN 60NM OF SCOTT AFB (1010 AND 1616 TAF'S: FORECAST "VCNTY" 2222 TAF: DEPENDS ON RADAR)
4 - 6 (RED ONLY)	=	ISSUE TORNADO MET WATCH ADVISORY AFTER 12Z SKEW-T AND UPPER AIR DATA ANALYZED. NEVER FORECAST TORNADOES IN TAF UNLESS A FAMILY OF TORNADOES IS REPORTED WITHIN 60NM UPSTREAM

THE ABOVE FORECAST SHOULD BE FINE TUNED BY CONSIDERING:

(1) VORTICITY ADVECTION BOTH AT 500 MB AND GEOSTROPHIC SURFACE

(2) WHETHER 850 MB MAX TEMP FIELD IS WEST OF SURFACE MOISTURE (T_d) RIDGE.

(3) 12-HOUR SURFACE PRESSURE FALLS $\geq$ 5 MB.

(4) 12-HOUR 500 MB HEIGHT FALLS $\geq$ 60 METERS.

END

DATE
FILMED
10-81

DTIC